

CEIP 22-1

# DRAFT

## SANTA BARBARA CHANNEL VESSEL TRAFFIC STUDY

Prepared for

CALIFORNIA COASTAL COMMISSION  
SAN FRANCISCO, CALIFORNIA 94105

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COASTAL ZONE  
INFORMATION CENTER

Prepared by

CALIFORNIA MARITIME ACADEMY  
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PART A: DESCRIPTIVE INFORMATION

Section 1. Purpose of the Study

A. Background

Chevron USA, Inc. submitted a Plan of Exploration (POE) to drill up to two exploratory wells to search for oil and gas in the northeast corner of OCS-P-0205 in the Sockeye Field, Santa Clara Unit. The drillship Glomar Coral Sea would be moored in the 500 meter buffer zone adjacent to the northern side of the Northbound Coastwise Traffic Lane of the Santa Barbara Channel Traffic Separation Scheme for this purpose.

B. History

In April 1981 the National Maritime Research Center (NMRC), Kings Point, New York, published a Santa Barbara Channel Risk Management Program for the California Coastal Commission. This program was carried out to determine means to minimize risks to facilities and to the environment resulting from offshore oil and gas resource recovery and vessel traffic in the Channel. This program utilized the Computer Assisted Operations Research Facility (CAORF) ship bridge simulator at NMRC to examine ship and master performance. NMRC received support from several maritime consulting firms in the preparation of this report.

The NMRC study had been made with this geographical area

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2234 South Hobson Avenue  
Charleston, SC 29405-2413

in mind but with the primary interest in drill sites in the separation zone or in gated situations--a drillship or platform on each side of the channel.

#### C. Goals of Study

The California Coastal Commission decided in late 1981 to require a vessel traffic study be conducted for this particular site when the drillship was on station. This study was carried out by the California Maritime Academy to assess the impact on marine navigation of a fixed petroleum exploratory rig sited in the buffer zone of the Santa Barbara Channel Vessel Traffic Separation Scheme and to make findings and recommendations relevant to similar rig sitings. The study's objectives were to gather data, both from rig personnel and passing vessels' masters, pertinent to environmental conditions, vessel's position, course and speed, and the impact of the rig on navigation in the Vessel Traffic Separation Scheme (VTSS), and to computer process the data to determine correlations which are applicable to a detailed analysis of navigation and vessel safety in the affected area.

### Section 2. Area of the Study

#### A. Description of Locale

The drillship Glomar Coral Sea went on station on 28 February, 1983, commenced operations on 1 March and completed them on 14 May. The drillship was moored in 720 feet of water for the purpose of drilling a well in

Latitude  $34^{\circ}07'45.10''$  North, Longitude  $119^{\circ}24'01.92''$  West. This location is about three-quarters of a mile north of the Channel Islands National Marine Sanctuary and 6.8 miles north of Anacapa Island, about 10 miles southwest of Ventura, and approximately 4.5 miles west-northwest of the bend in the Northbound Coastwise Traffic Lane off of Anacapa Island Light. This position is within the 500 meter buffer zone on the edge of the TSS and with the moon pool (center of drill rig) 400 feet from the northern side of the traffic lane. Anchor buoys showing flashing white lights were secured to the four anchors north of the traffic lane. The other four anchors were in the traffic lane, unmarked and with cables slacked so that at the edge of the lane each cable was over 300 feet below the surface.

B. Description of Traffic Separation Scheme

The Northbound Coastwise Traffic Lane of the Santa Barbara Channel Traffic Separation Scheme (TSS) runs from a position off Pt. Vicente on a course of  $300^{\circ}$  True to a position bearing about  $025^{\circ}$  True, 5.4 miles from Anacapa Island Light, then it changes direction to  $285^{\circ}$  True for some 60 miles to a position off Pt. Conception. The TSS consists of a Separation Zone two miles wide with a one mile Traffic Lane on either side. About 4 miles southeast of the turn at Anacapa Island there is a Safety Fairway for movement in and out of Port Hueneme.

### C. Traffic Separation Scheme Regulations

This TSS is in international waters and mariners therefore must comply with the International Regulations for Preventing Collisions at Sea (72 COLREGS). Rule 10 of these COLREGS specifies the actions to be taken by vessels in or approaching a TSS. The Rule in part requires vessels to:

1. Proceed in the appropriate lane;
2. So far as practicable keep clear of a traffic separation line or zone;
3. Normally join or leave a TSS at a termination of the lane or at a slight angle;
4. So far as practicable avoid crossing a lane, but if necessary, do so as nearly as practicable at right angles to the general flow of traffic;
5. Normally not use inshore traffic zones for through traffic if appropriate traffic lane within the adjacent TSS can safely be used;
6. Not normally enter a separation zone or cross a separation line except in cases of emergency to avoid immediate danger or to engage in fishing in the separation zone;
7. A vessel not using a traffic separation scheme shall avoid it by as wide a margin as is practicable.

#### D. Traffic Patterns

Ships were noted entering and leaving Port Hueneme utilizing the Safety Fairway that is some 8-9 miles from the drillship. No problems were caused by these vessels and, unless they proceeded westward and passed the drillship, no record was made of them. On three occasions tugs with tows and once a tug with a drill platform under tow passed inshore of the drillship with a clearance of 1 mile or more. Four other vessels passed to the north (inshore) of the drillship and out of the traffic lane. In general, however, the vast majority of the ships passed the drillship to their starboard, although many went into the separation zone doing so. Small crew and supply boats serviced the drillship from Port Hueneme. There was usually one each morning plus other craft as needed. Normally the crew and supply boats tied up to the port side of the drillship—side opposite the channel—but occasionally craft would be secured on both sides. The ready boat, a supply boat, was moored to a buoy about one half a mile away to the north at all times.

#### E. Bordering Sanctuaries

All waters of the Continental Shelf within three miles of the shoreline of California and those within one mile of the Channel Islands National Monument consisting of most of the Santa Barbara and Anacapa Islands are under the jurisdiction of the State of California. The Marine

Protection, Research, and Sanctuaries Act of 1972 prescribed the Channel Islands National Marine Sanctuary which extended six miles from the shorelines of the various Channel Islands. Due to the opposition of the Federal Government and the California Coastal Commission to drilling in the sanctuary, the drillship was moored in the buffer zone on the northern side of the TSS. The drillship could not be moored any further from the TSS due to the location of the oil field to be tested and the limitations of the angle from the vertical that the drill could safely operate.

F. Siting Restrictions

The California Coastal Commission in their Consistency Certification and Staff Recommendation CC-9-81 listed the recommended conditions for siting temporary drilling rigs in the buffer zone of the TSS.

1. The Western Oil and Gas Association, in cooperation with the Pacific Merchant Shipping Association and the Los Angeles Steamship Association, published a position paper on the Santa Barbara Channel sea lanes. Briefly, the statement recommends that no permanent drilling rigs, that is, platforms, be permitted within 500 meters of the traffic lanes but that exploratory structures be allowed in all areas of the Channel except in the sea lanes and the fairway approach to Port Hueneme. Six conditions are recommended for siting temporary rigs in the buffer zone:

- a. Anchors and equipment shall be submerged at least 100 feet below the sea lane water surface;
  - b. The drilling vessel should have 24-hour VHF radio transmitting and receiving capability;
  - c. The drilling vessel should have 24-hour radar surveillance;
  - d. Temporary drilling vessels shall be at least three miles apart from one another;
  - e. Drilling vessels should have proper lighting and adequate sound signals, prescribed by International Law; and
  - f. The radio and radar operator should be properly trained and capable of identifying approaching vessels so that the operator may attempt to contact any vessel that appears to be approaching close to the drilling rig.
2. The Commander Eleventh Coast Guard District in his letter to the California Coastal Commission Serial 16613 dated November 30, 1981, set out criteria and conditions for siting drilling rigs in the buffer zones. The Coast Guard believes that drilling can safely take place within the buffer zones if several conditions are met. The Coast Guard would object to a proposal for drilling within 500 meters of the sea lanes unless the proposal meets the following test:
- a. Has the need to drill in the buffer zone been satisfactorily established both geographically



and economically? The Coast Guard relies on the U.S. Geological Survey to make this determination. If there is any way the oil company applicant can feasibly obtain desired results by drilling outside the buffer zone, the Coast Guard will not approve the buffer location.

- b. The drilling site must be as far from the edge of the sea lane as possible.
- c. No drilling within the buffer zone can occur if a "gated" situation exists; in other words, if other structures, whether permanent or temporary, are located within 1000 meters of the opposite side of the lane for a distance of two miles.

If the drilling proposal can satisfy the above requirements, the Coast Guard then will apply the following conditions:

- a. A Notice to Mariners, at least 60 days in advance of the drilling start-up, and preferably 120 days, for any drilling activity located within two miles of the traffic lane;
- b. Class A navigation aids must be used, including four 5-mile visibility quick-flashing lights on a platform or one similar light at each end of a drillship and a 3-mile audibility foghorn;
- c. No buoys permitted within the lanes themselves;
- d. Chains from the drillship to the anchors must be at least 100 feet below the surface of the lane.

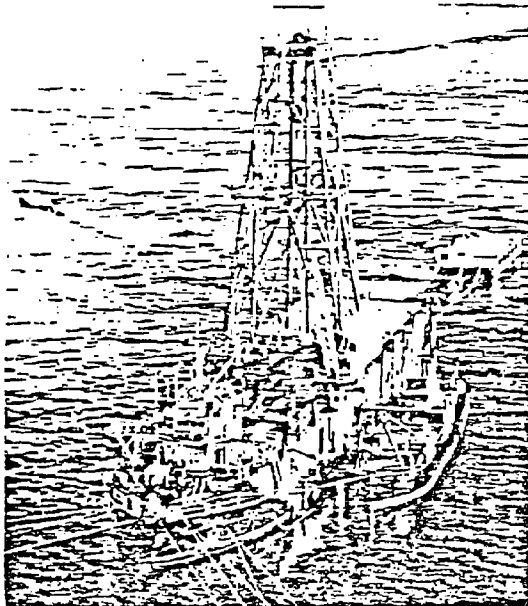
The U.S.G.S. and the Coast Guard have a Memorandum of Understanding to allow inspections to enforce these conditions. If these conditions are not met, the company is fined \$100,000 per day of violation.

The Coast Guard also considers whether the buffer zone is adjacent to an inbound or outbound lane. If the outbound lane is the one affected, the risk to navigation can be reduced through a special notice to all captains leaving southern California ports advising them of the location of a drilling rig in the buffer zone in the Channel.

The Coast Guard requires Class A navigation aids on every drillship and platform, regardless of location. Therefore, this is not a special condition for this proposal. The Coast Guard also routinely boards vessels in the Ports of Los Angeles and Long Beach on a random basis to enforce its navigation requirements, such as checking that radar and radio equipment are in working order and that charts are updated.

### Section 3. Description of Drilling Vessel

#### A. Typical Large Drilling Vessel



#### B. Key Characteristics of Glomar Coral Sea:

##### 1. Major Dimensions:

- |                       |  |
|-----------------------|--|
| a. Length overall     | 400'0"   |
| b. Beam molded        | 65'0"  |
| c. Depth at side      | 26'9"  |
| d. Draft at load line | 21'0"  |
| e. Center well        | 20'0" x 22'0"  |
| f. Propulsion         | Twin screw, each driven by 3 GE752RI<br>electric motors, each motor rated 750<br>hp. |
| g. Estimated speed    | 10.0 knots at full load  |

##### 2. Loading Data:

- |                                |                  |
|--------------------------------|------------------|
| a. Lightship Displacement      | 6,254 long tons  |
| b. Maximum loaded displacement | 11,220 long tons |
| c. Maximum variable load       | 4,966 long tons  |

3. Ground Tackle:
  - a. 12 - 30,000 lb. anchors
  - b. 3 with 4000 feet 2 1/4 inch stud link chain  
4 with 2000 feet 2 1/4 inch stud link chain used with 2 1/4 inch wire rope.
4. Anchor Winches:
  - a. 8 wildcat chain windlasses hydraulic driven
  - b. 4 hydraulic wire line winches
5. Heliport:
  - a. Dimensions 83'0" x 94'0"
  - b. Load capacity 12,300 lbs. per sq. ft. equal to Sikorsky S-61 helicopter
  - c. Jet refueling system 2,000 gal. capacity
6. Living Quarters:

Air conditioned quarters and dining facilities for seventy-four (74) men.
7. Meteorological Instruments:
  - a. Wind gauge
  - b. Barometer
  - c. Thermometer
  - d. Anemometer
  - e. Wave rider buoy
8. Communications Equipment:
  - a. PA system
  - b. Sound powered telephone system
  - c. 1 - Hallicrafter receiver, Model S-240
  - d. 1 - Collins VHF/FM radio transceiver, Model MR 201B

- e. 1 - ITT MacKay marine portable lifeboat radio  
transmitter/receiver, Model 401A
  - f. 1 - Radiomarine Hi-seas radio consoled, Model CRM-C3B
  - g. 1 - ITT MacKay marine radio telephone SSB MF/HF, Type 224A
  - h. 1 - Heliport radio transceiver, Narco Com. 11A
  - i. 2 - CAI Model CA-35 MS transceiver
9. Electronic Navigational Aids
- a. Loran, Nelco Auto-Fix 500
  - b. Fathometer, Raytheon, Model DE-731
  - c. Radio direction finder, CEC Bernmar, Model ADF-200
  - d. Sperry Gyro-Compass, MK 14, Model 1
  - e. Radar, Decca RM-914 (two units one with antenna forward and one with antenna aft, not interconnected)
  - f. Collision Avoidance Early Warning Device, Radar Devices Inc.  
MK III on after radar
10. Power Plants:
- a. Main Power Plants
    - 1. AC Power - 6 GE 800 kw generators, 600 v, 3 phase, 60 cycle, driven by six (6) Caterpillar D-399 diesel engines, rated capacity, 1,130 hp continuous.
    - 2. DC Power - 6 GE SCR AC to DC power conversion units. Rated capacity 800 hp continuous, 1,000 hp intermittent.
  - b. Emergency Power
    - a. 1 GE 175 kw AC emergency generator driven by one(1) GMC 8V/7IN diesel engine.

C. Watch Schedules

While the drillship was on station, drilling operations and/or testing continued 24 hours a day. The bridge watch consisted of two Third Mates alternately standing six-hour watches manning the radars and bridge radios. Each mate was qualified as a radar observer and as a marine radio operator. The engineering housekeeping load was maintained by an engineering watch. The two assigned Masters of the ship rotated every three weeks while the mates were on a two week on - two week off basis.

D. Anchor Arrangement

The drillship was anchored parallel to the Northbound Traffic Lane heading 105 True with eight anchors with 2428 feet of chain to each anchor. There was over 127,000 pounds of force at each anchor chock which kept the ship steady and allowed the chain to be over 300 feet beneath the surface at the channel, well below the mandatory 100 foot depth in the channel. By anchoring heading downstream the drillship presented the strongest and narrowest part of the vessel--the bow--to the oncoming traffic, thus reducing the size of the target and, in case of a collision, greatly enhancing the possibility of a glancing blow rather than a penetrating one. Direction of the prevailing wind is taken into account to minimize impact of escaping well gases and stack gases on the living quarters.

#### Section 4. Methods Used to Collect and Verify Data

##### A. Target and Environmental Data Records

Figure 1 lists the instructions for filling out the Target Data Record sheets shown in Figure 2. Figure 3 shows the instructions for filling out the Environmental Data Records shown in Figure 4. These forms were filled out by the Third Mate on watch on the Coral Sea and transmitted to the California Maritime Academy (CMA) via Chevron on completion of shift every two weeks for compilation.

##### B. Vessel Data Sheets

Chevron USA distributed 850 packets of papers to the Pilot Associations of Los Angeles/Long Beach, San Diego and Port Hueneme for further delivery to all northbound ships departing the listed harbors. These packets consisted of a cover letter of explanation, a copy of a Special Notice to Mariners re exploratory drilling, a questionnaire (Vessel Data Sheet) and a stamped envelope for returning the completed form. These are shown in Figures 5, 6, and 7 respectively.

##### C. Methods Used to Verify Data

1. Three trips were made to the drillship by CMA representatives to interview the master and the watchstanders collecting the information to ensure compliance with the instructions. The masters and mates cooperated most fully.
2. The forms were checked on receipt at CMA for completeness and any obvious errors.
3. The Vessel Data Sheets were checked against the two forms from the Coral Sea for identification purposes and verification of certain data. These checks revealed that of the eighty-two (82) Vessel Data Sheets returned, only two (2) revealed significant variation in data, such as CPA or time of passage.

Figure 1

TARGET DATA RECORD: INSTRUCTIONS

GENERAL

- (1) Completed Target Data Records (TDR's) are to be mailed to Chevron for forwarding to the California Maritime Academy (CMA) on shift change days every two weeks.
- (2) Radar observer is to print his name in the remarks column (Column 8) when relieved.
- \*(3) Search on 24 mile scale. Down shift during tracking to have target in outer  $\frac{1}{2}$  of scope during working to ensure accuracy.

SPECIFIC

- (1) COLUMN 1 - Log local time of observation. Make observations on the minute + 5 seconds. Targets are to be logged every 6 minutes from detection until past CPA.

- (2) COLUMN 2 - Identify target being observed or commented on.. Target numbers are assigned sequentially upon first detection.  
EXAMPLE:

<u>Time/Date</u>	<u>Target Number</u>
<u>First Detected</u>	
2358/31 Jan.	1/215 (215th target of Jan.)
0008/1 Feb.	2/1 (1st target of Feb.)

- (3) COLUMN 3 - Target range in nautical miles and tenths of nautical miles.
- (4) COLUMN 4 - Target bearing in degrees and tenths of degrees (True).
- (5) COLUMN 5 - Check appropriate column. If "Yes" note time of communications in COLUMN 8. If approaching vessel has not called Coral Sea by a range of 4 miles, attempt to originate VHF communications with the vessel.
- (6) COLUMN 6 - If "Yes" in COLUMN 5, check who originated communications.
- (7) COLUMN 7 - Check "Yes" if course/speed change noted by radar observer or reported by approaching vessel on VHF.
- (8) COLUMN 8 - Log any observation considered pertinent. EXAMPLES:
  - (a) Vessel description, name, radio call, stack insignia, nationality. If name of vessel and/or radio call not given, try to obtain some information to identify ship so that your report and ship reports can be correlated.
  - (b) "appeared to c/c to starboard to avoid supply boat."
  - (c) Time Coral Sea (1) buoy lights on/off  
(2) sound signals on/off
  - (d) Communications problems.

\*NOTE: Track all targets north of center line of Separation Zone.



Figure 2

[illegible]

Figure 3

ENVIRONMENTAL DATA RECORD: INSTRUCTIONS

- (1) COLUMN 1 - Log local time of observation. Make observation on the indicated hour + 5 minutes. If weather/visibility conditions change markedly, note the time and the nature of change at bottom of day's log.
- (2) COLUMN 2 - HEIGHT OF WAVES  
  
Use Table 2.26, page 2-120, National Weather Service (N.W.S.) Observing Handbook No. 1, January 1982.
- (3) COLUMN 3 - Enter direction swells are coming from in degrees true. Enter "0" if no swells.
- (4) COLUMN 4 - Enter average wind speed in knots over a 30-60 second observation.
- (5) COLUMN 5 - Enter average direction wind is coming from in degrees true. Enter "0" if light and variable.
- (6) COLUMN 6 - Enter your estimated visibility in nautical miles.
- (7) COLUMN 7 through 12 - Check objects you can see. If your location or location of "Check Rigs" is changed, note change at bottom of log.
- (8) COLUMN 13 - PRESENT WEATHER  
  
Use Present Weather Code Specifications (ww) in the order of priority in Table 2.17, page 2-88 through 2-93 of N.W.S. Observing Handbook.

Fig. 1

ENVIRONMENTAL DATA RECORD (EDR)

DAY	DATE
1	1/1/19
2	1/2/19
3	1/3/19
4	1/4/19
5	1/5/19
6	1/6/19
7	1/7/19
8	1/8/19
9	1/9/19
10	1/10/19
11	1/11/19
12	1/12/19
13	1/13/19
14	1/14/19
15	1/15/19
16	1/16/19
17	1/17/19
18	1/18/19
19	1/19/19
20	1/20/19
21	1/21/19
22	1/22/19
23	1/23/19
24	1/24/19
25	1/25/19
26	1/26/19
27	1/27/19
28	1/28/19
29	1/29/19
30	1/30/19
31	1/31/19

DATE \_\_\_\_\_

L2T SUNRISE SUNSET

**TESSINS**

[illegible]

## CALIFORNIA MARITIME ACADEMY

P.O. BOX 1392  
VALLEJO, CA 94590  
707-644-5501



Figure 5

Dear Captain:

The California Maritime Academy has contracted with the California Coastal Commission to conduct a "Santa Barbara Channel Vessel Traffic Study." This study is to assess the impact on ship traffic of a fixed petroleum exploratory rig anchored adjacent to the northbound lane of the Santa Barbara Channel Vessel Traffic Separation Scheme (VTSS).

It is requested that the enclosed form be filled out as completely as possible each time your vessel passes northbound in the VTSS and return it by mail as soon as practicable. Any comments, notes, or telephone calls to improve this project would be greatly appreciated.

Sincerely,

FRED B. NEWTON  
Marine Analyst

FEN:at

Encl: Questionnaire w/envelope

Figure 6

SPECIAL NOTICE TO MARINERS

EXPLORATORY DRILLING

SANTA BARBARA CHANNEL

February 1983

The following information is contained in Local Notice to Mariners 9-83 issued by the Commander Eleventh Coast Guard District (oan) on 23 February 1983.

On or about March 1, 1983, the drilling vessel "GLOMAR CORAL SEA" will commence exploratory drilling operations at position  $34^{\circ}07'45''$  N. Latitude,  $119^{\circ}24'02''$  W. Longitude. This location is approximately 100 yards North of the Northbound Traffic Lane of the Santa Barbara Channel Traffic Separation Scheme and approximately seven miles North of Anacapa Island.

The drilling vessel will be at this location for approximately 80 days. Any changes to the schedule of the drilling operations will be published in future Local Notice to Mariners and/or broadcast Notice to Mariners as they are known. The drilling vessel will monitor VHF-FM Channel 16 (156.800 MHz) at all times and be ready to pass updated information.

The chart below is reprinted from National Ocean Survey Chart Number 18720.

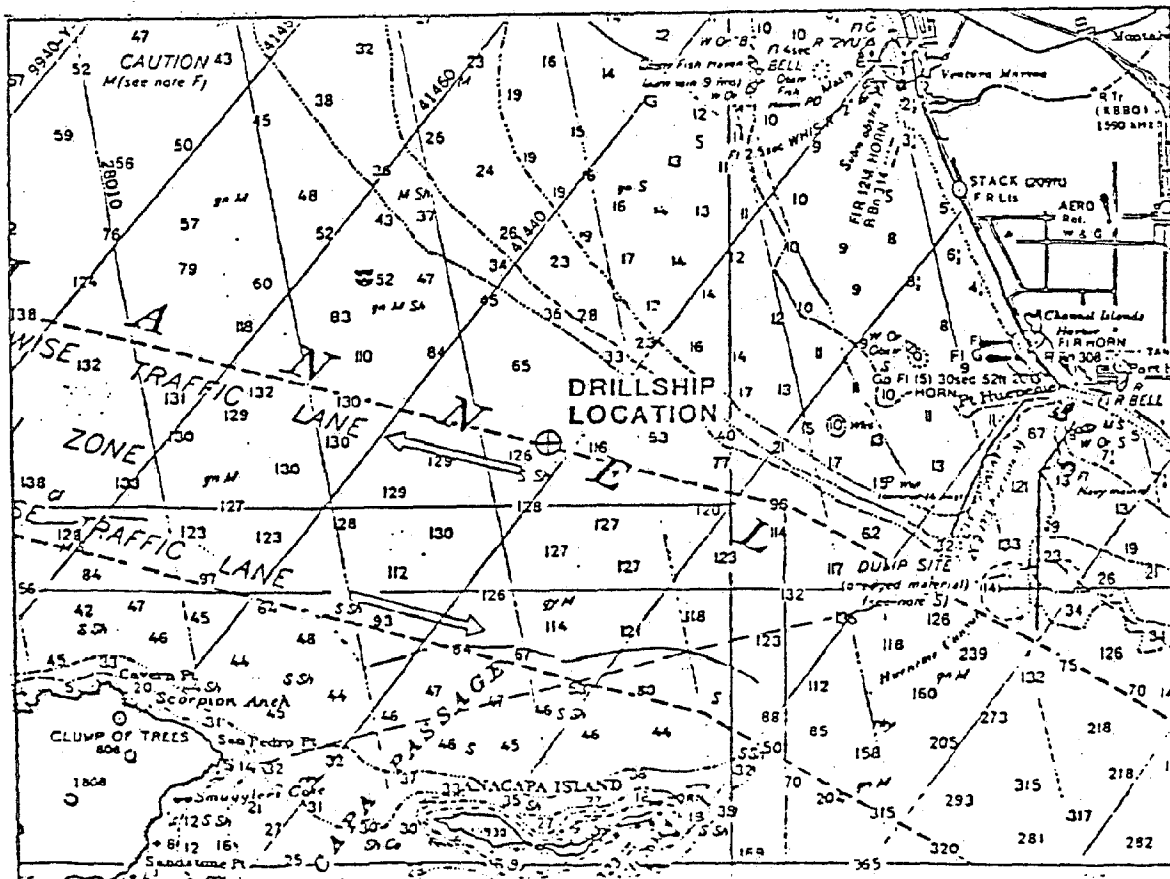


Figure 7

Date of Passage                      Ship                      Port of Ship                     

Old Name                      Propulsion                      MW SS GT Sea Speed                     

(1) Darkness (2) Darkness Visibility                      Good (over 10) Fair (4-10) Poor (under 4) Fog (1 or less)

Wave height at time of passage.                      feet

Wind speed at time of passage (in knots).                     

Range in nautical miles at which the drilling ship was first plotted on radar.

long(10+) medium(5-10) short(5-

Distance in nautical miles at which the drilling ship was sighted visually.

long(10+) medium(5-10) short(5-

Time and distance the drilling ship was passed abeam.

Time                      Distance                     

What distance do you consider to be adequate for safety for your vessel when abeam of the drilling ship?

.1 to .5/.5 to 1.5 mi/  
1.5 to 2.5 mi/2.5 or more miles

Was it necessary for you to maneuver within 5 miles of the drilling ship in order to pass the drilling ship at a safe distance abeam?

Yes                      No                     

Was it necessary for you to maneuver within 5 miles of the drilling ship in order to safely avoid other traffic?

Yes                      No                     

STRONGLY AGREE(SA), AGREE(A), UNDECIDED(U), DISAGREE(D), STRONGLY DISAGREE(SD)

\*\*The location of the drilling ship is a hazard to safe navigation under fair weather and good visibility conditions.

SA A U D SD

\*\*The location of the drilling ship is a hazard to safe navigation under conditions of reduced visibility.

SA A U D SD

\*\* Location of the drilling ship is an aid to navigation.

SA A U D SD

It is necessary for safety to have a radar installed on the drilling ship for the watch to monitor approaching traffic.

SA A U D SD

It is necessary for safety to have a certified radar observer on the drilling ship to maintain radar plots of approaching traffic.

SA A U D SD

It is necessary for safety to have a certified marine radio operator on duty on the drilling ship at all times for bridge to bridge communication.

SA A U D SD

\*\*The drilling ship should be fitted with additional safety warning devices.

SA A U D SD

It is desirable to exchange radar plot information with the drilling ship when making an approach to the southbound traffic lane in the vicinity of the drilling ship from outside the traffic lane.

SA A U D SD

It is desirable to exchange radar plot information with the drilling ship when making an approach to the platform in the northbound traffic lane.

SA A U D SD

Under adverse environmental conditions, with high winds and rough seas, maneuverability in the vicinity of the drilling ship would be difficult.

SA A U D SD

Under heavy traffic conditions, six or more vessels in the area, it would be difficult to maneuver in the vicinity of the drilling ship.

SA A U D SD

With high drilling ship density in the immediate area of the existing drilling ship, ship maneuverability would be difficult.

SA A U D SD

MASTER'S COMMENTS (Please include comments on \*\* above. Use additional sheets if necessary.)

(Signature of Master)

## PART B. ENVIRONMENTAL DATA

### Section 1. Ocean Currents

Currents in the Santa Barbara Channel are variable, depending to a great extent upon the wind. It appears that a weak non-tidal flow sets easterly in the Spring and Summer and westerly in the Fall and Winter. There is a strong inshore set on a rising tide in the Hueneme Canyon which could affect northbound vessels in particular. Reports have been received indicating currents as high as 3.0 knots but these are quite unusual.

### Section 2. General Wind Conditions

Only a few tornadoes (funnel clouds touching the ground) or waterspouts (touching the water) are reported in California a year. They are much smaller than their counterparts in the Gulf States and do less damage.

The Channel Islands form a natural wind break for southerly and southwesterly winds while the mountains on the mainland reduce the effect of northerly winds. Northeasterly winds through the Ventura Flats as well as Santa Ana winds can be strong—up to 50 knots—but sea conditions are not excessive due to the short fetch. Strong westerly and northwesterly winds can and do cause severe choppy seas to run down the Santa Barbara Channel.

The daytime seabreeze and nighttime land breeze cycle dominates the coastal wind regime 80 to 90 percent of the time. As land heats and cools much quicker than water, winds blow onshore from about 1000 to early evening and then reverse. The Channel Islands cause local eddies and deflections to the prevailing pattern resulting in west-northwesterly direction of flow at Santa Cruz Island.

### Section 3. Weather Data

This section will compare the actual environmental data acquired with average environmental data for the area from the Environmental Data Service as shown in NOAA Coast Pilot 7 and other sources.

The purpose of this comparison is to demonstrate whether or not the weather encountered during the study period was average or abnormal.

#### METEOROLOGICAL TABLE FOR COASTAL AREA OFF POINT MUGU

Boundaries: Between 34 N., and 36 N., and from 125 W., eastward to coast

<u>Weather Elements</u>	<u>March</u>	<u>April</u>	<u>May</u>
Wind = 34 knots (*)	.9	1.1	.8
Wave height = 10 feet (*)	10.7	16.2	11.5
Visibility 2 naut. mi. (*)	4.4	8.3	8.1
<u>Precipitation (*)</u>	<u>4.8</u>	<u>3.8</u>	<u>2.3</u>
<u>Prevailing wind direction</u>	<u>NW</u>	<u>NW</u>	<u>NW</u>

(\*) Percentage frequency.

(Excerpts from NOAA Publication "Coast Pilot 7.")



# DATA FROM DRILLSHIP

Figures given are percentage of days for given month (through 13 May) with at least one hourly reading at or above listed limits (or less than in visibility factor).

	March	April	May
Wind = 34 knots	32%	10%	15%
Wave height = 10 feet	65%	50%	62%
Visibility = 2 nautical miles	19%	10%	8%
Precipitation	42%	23%	0%
Prevailing wind direction	W x S	W x S	W x S

## PART C. TRAFFIC DATA

In Section 1 of this Part traffic data compiled by the drillship is tabulated and analyzed. Independent of Section 1, Section 2 lists the data as received from the passing vessels. Section 3 is an analysis of the data shown in Section 2.

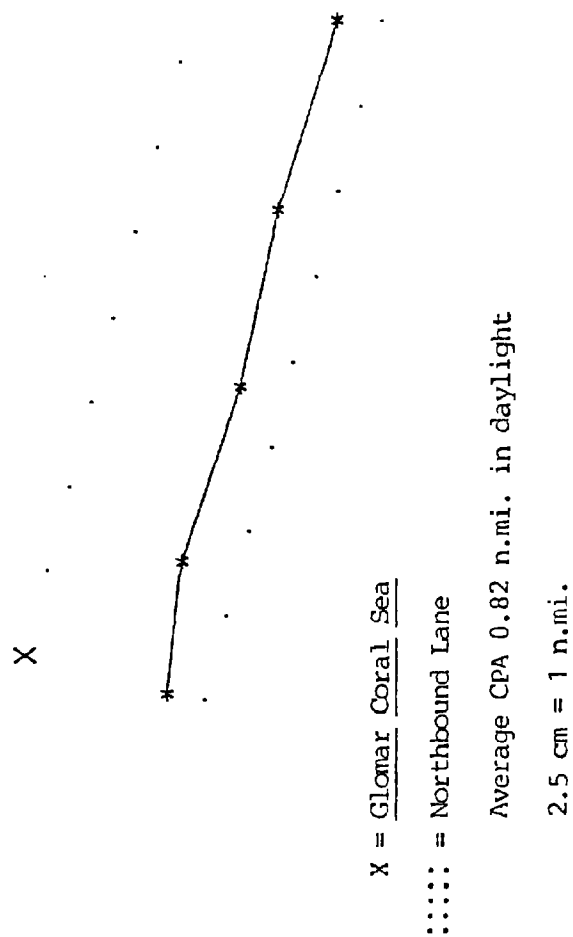
### Section 1. Data from Drillship

#### A. Tabulations

1. Appendix A lists all recorded traffic that passed the Drillship Glomar Coral Sea from 1 March to unmooring on 14 May 1983, inclusive.
2. Using the tabulated data and the Target Data Records, the mean closest point of approach (CPA) of vessels passing the drillship was 0.83 miles.
3. a. Figure 8a shows the mean track of all vessels passing to the south in the daytime, average CPA was 0.82 miles. Figure 8b shows nighttime passage with average CPA of 0.94 miles. Figure 8c depicts all vessels passing to the south with overall CPA of 0.83 miles.  
b. Examination of the raw data indicates that approximately 39% (306 vessels) passed the drillship in the Separation Zone, over one mile from the Glomar Coral Sea.  
c. Although LNM 9-83 indicated that drillships would have an anchoring system that may extend 5000 feet from the vessel and marked by lighted buoys, in fact the Glomar Coral Sea complied

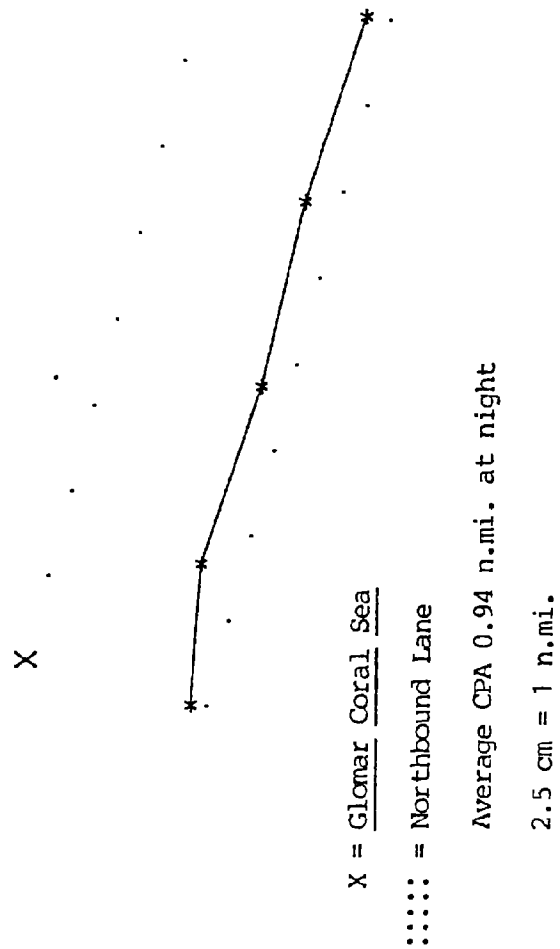
# AVERAGE TRACK - DAY

Figure 8a



# AVERAGE TRACK - NIGHT

Figure 8b



with instructions of Commandant Eleventh Coast Guard District dated November 30, 1981, and did not buoy or otherwise mark anchors in the VTSS. In view of the wide promulgation of LNM 9-83, it must be presumed that rightly or wrongly the prudent mariner would reasonably expect buoys marking the anchorage system to be in the northbound lane of the VTSS and thus would give the drillship a wider berth than normal, explaining the large number of vessels passing into the Separation Zone. This could possibly explain the reason for the mean CPA to be skewed to the left of the center of the Northbound Lane. Rules of the Road Rule 10 describes the conditions upon which a vessel in a Traffic Separation Scheme may enter a separation zone. A prudent passing master, anticipating outlying buoys a mile from the drillship, would be justified in entering the separation zone for a short period to avoid the anticipated obstructions. Further, not sighting the absent buoys might cause the passing vessel to stay longer in the separation zone as a precautionary measure. This would be particularly true during periods of darkness, restricted visibility, or rough weather. About 63% of the vessels passing at 1.0 mile or more CPA passed at night. Interference with traffic coming from the southbound lane would be minimized by the width of the separation zone.

(Note: Rule 10 applies only to IMO adopted traffic separation schemes. It is unknown, however, whether mariners draw this distinction in navigating adopted and non-adopted schemes.)

- d. Parenthetically it is noted that although the mean track of all vessels (Figure 8c) passed well outside the internationally recognized distance (500 meters) associated with safety zones around permanent structures on the Offshore Continental Shelf(OCS), there were a few vessels that passed inside this safety zone.

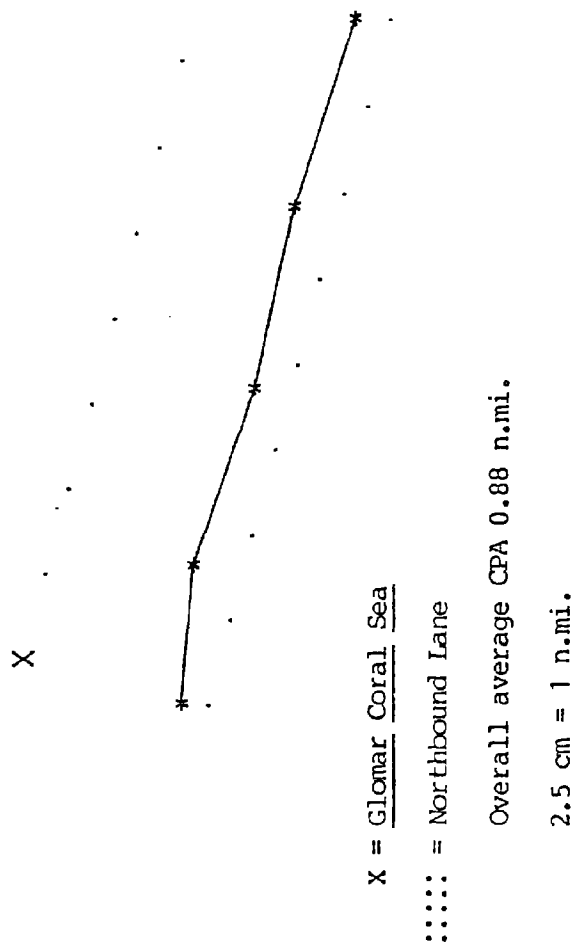
## Section 2. Data from Passing Vessels

### A. Questionnaires Received from Masters

Chevron USA prepared and distributed 950 copies of the questionnaire to the various Pilot Associations and the drillship logged some 793 vessels going by northbound. 82 completed questionnaires were received--a return of about 10.3% of the vessels going by. Not all vessels that passed the drillship had heard of this project--ascertained by radio conversations--but apparently most had. Very few U.S. tankers participated in the survey.

AVERAGE TRACK - DAY AND NIGHT

Figure 8c



B. Tabulated Information from Questionnaires

Of the 32 reports received the following is a compilation of the answers: (all vessels did not answer all questions)

Propulsion Motor vessel = 66 Steam = 10 GT = none reported

Daylight = 30 Darkness = 51

Visibility Good = 60 Fair = 15 Poor = 4 Fog = 0

Wave height at passage: 0-5 feet = 16 5.1-15 feet = 36

15.1-30 feet = 21 over 30 feet = 5

Wind speed at time of passage: 0-10 knots = 75 10-20 knots = 5

over 20 knots = 2

Initial radar range: over 10 miles = 78 5-10 miles = 2

less than 5 miles = 1

Initial visual sighting: over 10 miles = 62 5-10 miles = 13

less than 5 miles = 6

1. What distance do you consider to be adequate for safety for your vessel when abeam of the drilling ship?

0.1 to 0.5 mi. = 2 0.5 to 1.5 mi. = 38

1.5 mi. only = 3 1.5 to 2.5 mi. = 21

2.5 mi. or more = 14 No answer = 4

2. Was it necessary for you to maneuver within 5 miles of the drilling ship in order to pass the drilling ship at a safe distance abeam?

Yes = 50 No = 31

3. Was it necessary for you to maneuver within 5 miles of the drilling ship in order to safely avoid other traffic?

Yes = 28 No = 54



STRONGLY AGREE(SA), AGREE(A), UNDECIDED(U), DISAGREE(D), STRONGLY DISAGREE(SD)

- |  |           |          |          |          |           |
|--|-----------|----------|----------|----------|-----------|
| 4. The location of the drilling ship is    | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| a hazard to safe navigation under fair     | 4         | 25       | 3        | 40       | 9         |
| weather and good visibility conditions.    |           |          |          |          |           |
| 5. The location of the drilling ship is    | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| a hazard to safe navigation under          | 25        | 29       | 6        | 21       | 1         |
| conditions of reduced visibility.          |           |          |          |          |           |
| 6. The location of the drilling ship is    | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| an aid to navigation.                      | 2         | 17       | 11       | 36       | 15        |
| 7. It is necessary for safety to have      | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| a radar installed on the drilling ship     | 21        | 36       | 8        | 16       | 1         |
| for the watch to monitor approaching       |           |          |          |          |           |
| traffic.                                   |           |          |          |          |           |
| 8. It is necessary for safety to have a    | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| certified radar observer on the drilling   | 18        | 28       | 14       | 20       | 2         |
| ship to maintain radar plots of            |           |          |          |          |           |
| approaching traffic.                       |           |          |          |          |           |
| 9. It is necessary for safety to have a    | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| certified marine radio operator on         | 16        | 31       | 11       | 21       | 3         |
| duty on the drilling ship at all times     |           |          |          |          |           |
| for bridge to bridge communications.       |           |          |          |          |           |
| 10. The drilling ship should be fitted     | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| with additional safety warning devices.    | 15        | 26       | 15       | 24       | 0         |
| 11. It is desirable to exchange radar plot | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
| information with the drilling ship when    | 2         | 18       | 17       | 40       | 4         |
| making an approach to the southbound       |           |          |          |          |           |
| traffic lane in the vicinity of the        |           |          |          |          |           |
| drilling ship from outside the traffic     |           |          |          |          |           |
| lane.                                      |           |          |          |          |           |

- |   | <u>SA</u> | <u>A</u> | <u>U</u> | <u>D</u> | <u>SD</u> |
|---|-----------|----------|----------|----------|-----------|
| 12. It is desirable to exchange radar plot information with the drilling ship when making an approach to the platform in the northbound traffic lane. | 6         | 24       | 13       | 36       | 2         |
| 13. Under adverse environmental conditions, with high winds and rough sea, maneuverability in the vicinity of the drilling ship would be difficult.   | 16        | 37       | 10       | 16       | 0         |
| 14. Under heavy traffic conditions, six or more vessels in the area, it would be difficult to maneuver in the vicinity of the drilling ship.          | 31        | 34       | 5        | 11       | 0         |
| 15. With high drilling ship density in the immediate area of the existing drilling ship, ship maneuverability would be difficult.                     | 27        | 39       | 7        | 7        | 0         |

#### C. Master's Comments

Under the Master's comments 32 vessels submitted comments ranging from "no problem" to a full type written page of suggestions.

1. Five suggested utilizing a radar beacon—racon—on the drillship or platform for early warning and identification, while one other recommended the addition of radar reflectors.
2. Three suggested keeping platforms 1 to 1 1/2 miles from traffic lanes, while two recommended at least 3 mile clearance.
3. Several didn't expect to have any difficulties as long as the platform's position was properly promulgated.
4. Three suggested shifting the VTSS away from the rig if the rig couldn't be moved.

5. One suggested that no rig be located within 5 miles of a turn in the channel. Another wrote of the danger of the drillship being on the outside of the curve so that if the oncoming ship failed to turn or turned late to the new course a collision or a close quarters situation might exist.

### Section 3. Analysis of the Data Received from Passing Vessels

- A. For purposes of this analysis the "Agree" and "Strongly Agree" answers are consolidated as are the "Disagree" and "Strongly Disagree" answers. Not all questions were answered by all vessels. Percentages are of answers received for each question.

1. Ninety-six percent (78 of 81) of the vessels first plotted the drillship on the radar at over 10 miles range, while seventy-seven percent (62 of 81) reported sighting it visually over 10 miles away. These reports indicate the drillship presented a clear target both day and night to an observant mariner, weather permitting.
2. Forty-nine percent (38 of 78) considered a safe passing distance of 0.5 to 1.5 miles; of these only one passed less than 0.5 miles. Where 1.5 miles was given as a minimum distance 67% (16 of 24) had a Closest Point of Approach (CPA) of less than 1.5 miles. Of the 14 vessels reporting a 2.5 miles safety zone, 13 (93%) were inside this distance—2 at 0.8 CPA. The constraints of the VTSS—a one mile wide channel and a two mile separation zone undoubtedly caused many ships to pass closer than the Master considered safe.

3. Sixty-two percent (50 of 81) of the outbound vessels reported it was necessary to maneuver within five miles of the drilling ship to pass safely abeam. As a matter of fact the channel changed course about 4.5 miles from the drilling ship so the question was not really applicable. Thirty-four percent (28 of 82) reported the necessity to maneuver to avoid other traffic within 5 miles of the drill ship. It was noted that several times vessels would overtake and pass slower ships in this area which would require some minor maneuvering. There were also a few instances noted by the observers on the Coral Sea of action taken by outbound vessels to avoid fishing vessels in the area.
4. Question A1. The location of the drilling ship is a hazard to safe navigation under fair weather and good visibility conditions.
  - a. Sixty percent (49 of 81) disagreed that the drillship was a hazard under fair weather and good visibility, while 36% (29 of 81) agreed to the premise.
  - b. A breakdown of the variables involved in this question shows:
    - 1) The type of propulsion was not conclusive.
    - 2) Speed of ship passage was also inconclusive of itself--60% (32 of 53) with speed greater than 15 knots and 60% (17 of 28) with speed less than 15 knots both agreed to the question.
    - 3) Only one slight anomaly appeared when ship type was considered:
      - a) Container ships--54% (12 of 22) agreed that the drillship was a hazard, while breakbulk freighters--79% (15 of 19), tankers--73% (11 of 15), Ro-Ro vessels--73% (8 of 11), and bulk carriers--80% (4 of 5) all disagreed.

4) As this question proposed a clear weather situation, initial sighting distance and initial radar plotting distance were not critical factors. 62% (46 of 74) who sighted it more than 5 miles away and 61% (49 of 79) whose initial radar contact was greater than 5 miles disagreed with the question. Passage in daylight versus darkness showed some variance—daylight 70% (21 of 30) disagreed while only 54% (27 of 50) of those passing at night didn't consider it a hazard.

5) For the 29 vessels whose CPA was less than the Master considered safe, 19 (65%) agreed that the drill ship was a hazard. This is an expected result. 80% (23 of 29) of these vessels agreed that the hazard was present in reduced visibility also.

5. Question A2. The location of the drilling ship is a hazard to safe navigation under conditions of reduced visibility.

a. Sixty-eight percent of the reporting ships (56 of 82) agreed that the drillship was a hazard under reduced visibility conditions. When considering day against nighttime passage, 63% (19 of 30) in daylight and 72% (37 of 51) at night considered this a hazardous situation. The reports received from tanker masters (15) varied from the remaining ships' reports in that 7 agreed, 6 disagreed and 2 had no opinion as to the hazardousness of the situation. Due to the small sample, this variation is not considered critical.

b. All other criteria used to analyze the answers to the question--ship type, propulsion, distance of first sighting and/or radar plotting, speed, weather conditions, etc.--conformed quite closely with the overall answer of 68% agreeing that the drillship was a hazard under conditions of reduced visibility.

6. Question A3. The location of the drilling ship is an aid to navigation.

a. Sixty-three percent (51 of 81) did not consider the drillship an aid to navigation. One master reported using the ship as a heading mark but that the bright lights prevented a proper lookout, while another commented to the effect that the drillship position is not "guaranteed" thus it could not be a nav. aid. Comments were received showing the vessels used land for the purpose of determining one's position rather than the drillship. The Channel Islands provide excellent radar and visual points for accurate navigation.

7. Question A4. It is necessary for safety to have a radar installed on the drilling ship for the watch to monitor approaching traffic.

a. Seventy percent (57 of 82) felt that a radar should be installed and operated on the drillship. Every criteria available but one showed a 66% to 79% agreement on this question. The only variance was received from the 15 tanker masters--46% said "yes", 34% said "no" and 20% were undecided. It is felt that the three "undecided" answers had too large an impact for this group to be considered separately.

8. Question A5. It is necessary for safety to have a certified radar observer on the drilling ship to maintain radar plots of approaching traffic.

a. Fifty-seven percent of all respondents (46 of 82) recommended having a certified radar observer maintaining plots while only 26% (22 of 82) disagreed. The Master of one ship commented that the installation of radar and use of radar observers on the drillship "not for our ship but from experience we know that several other ships have very poorly qualified officers for whom it may be helpful." The Master of a large U.S. container ship commented, "I can see no need for any exchange of RADAR information whether northbound or southbound unless the drillship were underway. Once again I stress that if it's not moving, it really doesn't present any problem." Of the 29 vessels that passed with a CPA of less than the Master considered safe, 72% (21) agreed to the necessity of having radar and radar observers on the drillship.

9. Question A6. It is necessary for safety to have a certified marine radio operator on duty on the drilling ship at all times for bridge to bridge communication.

a. Fifty-eight percent (47 of 82) agreed to the requirement of a "certified marine radio operator" on duty.

b. Of those passing during daylight only 37% (11 of 30) recommended a certified operator while 69% (35 of 51) that passed at night recommended one. One U.S. Master stated a radio watch with an operator familiar with the location of work boats in the area would be sufficient.

- c. Variations in wind strength and wave height at time of passage didn't show any appreciable change in the percentage agreeing to the premise.
  - d. Not surprisingly, 65% (19 of 29) of the vessels with a CPA of less than the Master considered safe opted for a "certified marine radio operator."
  - e. Considerable difficulty was noted by the Mates on the drillship in communicating with passing vessels. Target Data Records indicate a large number of vessels passed in silence.
10. Question A7. The drilling ship should be fitted with additional safety warning devices.
- a. Only 41 of 80 agreed that the drillship should have more safety warning devices while 24 disagreed and 15 were undecided. Five of the masters in their comments recommended installation of a radar beacon--~~racon~~--on the drillship or platform while one other suggested use of radar reflectors to enhance the radar reflection. One suggested employing four flashing light buoys around the drillship. (The anchors to the north of the ship were already so marked. The channel depth was 750 feet deep in the area and buoyage would not be too practical although possible.)
  - b. Fixed-frequency racons which respond to an interrogation on a special frequency require special equipment on the ship. The maritime industry resisted this due to its increased cost. A frequency-agile racon was then developed which determines the



frequency of the interrogating radar and responds on that frequency. This solved many problems and research was able to alleviate other problems. There is still disagreement between frequency-offset and time-offset methods of producing the racon signal although radar beacons are in use throughout the world.

- c. LCDR Charles B. Mosher, USCG, in his article "Racons as a Short Range Aid to Navigation" discusses the future use of racons. Originally racons were usable only on 3 cm radars (not 10 cm) thus providing incomplete coverage. Now two methods of producing the specialized service are under development, time-offset and frequency-offset. LCDR Mosher states, "Manufacturers and various radio/radar technical committees will be debating the merits of each method for some time. Once agreement is reached and the technical parameters are specified, the racon will become a short range aid to navigation rather than an identification device." Each of the two methods however can be used to identify targets but care must be taken not to have too many in the same geographic area for fear these identifying signals would mask other radar targets. The U.S. Coast Guard is testing frequency-agile racons and hopes to solicit bids for approximately 100 units. LCDR Mosher anticipated operational deployment will begin early in 1986.

11. Question A8. It is desirable to exchange radar plot information with the drilling ship when making an approach to the southbound traffic lane in the vicinity of the drilling ship from outside the traffic lane.

- a. Only 24% (20 of 81) agreed while 54% (44 of 81) disagreed with this premise. The "voting" of all elements involved conformed very closely to these figures. Unless there was a port nearby from which vessels would exit and pass the drillship and make a southbound passage, there would be little, if any, cause for such communication. As the drillship or platform is stationary, there is little need to exchange plot information except for dire emergency.
12. Question A9. It is desirable to exchange radar plot information with the drilling ship when making an approach to the platform in the northbound traffic lane.
- a. Thirty-seven percent (30 of 81) agreed while 46% (38 of 81) disagreed on this question. Although 57 masters stated it was necessary for the drillship to have a radar installed and 46 desired the drillship to have a "certified radar observer" to maintain radar plots of approaching traffic, only 30 said it was desirable to exchange this information with approaching northbound vessels. As in Question A8, there would appear to be little need to exchange radar plot information with a moored vessel except in cases of dire emergency. It appears the primary need for a radar and observers on the platform or drillship would be to serve as a warning device in case of approaching vessels that did not appear to be taking timely and sufficient action to avoid the moored vessel.

13. Question A10. Under adverse environmental conditions, with high winds and rough sea, maneuverability in the vicinity of the drilling ship would be difficult.

a. Sixty-seven percent (53 of 79) agreed to this premise. When looking at the breakdown of vessels by type, little difference shows up--the percentages are basically the same. It must be agreed that adverse environmental conditions do render shiphandling difficult and thus increases the possibility of loss of control and possible collision. In this vicinity, however, there are not many days of extreme weather conditions during the year, thus reducing this possibility.

14. Question A11. Under heavy traffic conditions, six or more vessels in the area, it would be difficult to maneuver in the vicinity of the drilling ship.

a. Seventy percent (65 of 81) agreed to this and only 11 disagreed.

A review of the Target Data Reports and interviews of the Masters and Mates of the Coral Sea showed that very seldom were there more than two ships in the near vicinity of the drillship at any one time. The work boats servicing the Coral Sea stayed to the north of it except for limited situations. This alleviated the traffic problem to a large extent. Southbound vessels in no way hampered shipping in the northbound lanes, even when northbound vessels transgressed into the Separation Zone.

15. Question A12. With high drilling ship density in the immediate area of the existing drilling ship, ship maneuverability would be difficult.
- a. Eighty-two percent (66 of 80) agreed to this question with only seven disagreeing. The last question referred to several maneuvering ships in the vicinity while this question poses the thought of several platforms or stationary drillships with no maneuverability in the area. This obviously complicates the case and increases the difficulty although the maneuvering ship would not have to worry about the actions of the platform/drillship—there would be no movement.

#### PART D: CONCLUSIONS AND RECOMMENDATIONS

These conclusions and recommendations are based upon the actions of nearly 800 vessels passing the drillship Glowar Coral Sea, the reports received from 82 of them answering questions pertinent to the operation, and personal interviews and observations.

1. When mooring a drillship, effort is naturally made to cause the prevailing wind to blow from the living quarters toward the drilling mast to keep gases from polluting these quarters. Where at all possible, efforts should also be made to moor the drillship with its bow toward the oncoming traffic to reduce the width of the target and to present the strongest portion of the vessel toward the approaching vessels in order to reduce damage in case of collision.
2. a. Drilling ships conducting exploratory drilling adjacent to the traffic lanes of the VTSS present a risk to passing traffic. However, this risk is alleviated to some extent if the fact is well promulgated in "Notice to Mariners," "Local Notice to Mariners" and at frequent intervals by the U.S. Coast Guard on VHF channel 22A, the "Marine Information Broadcast." It must be noted that this publicity is being accomplished at the present time, although a number of errors in "Local Notices to Mariners" have been noted in the past as to the precise location of drilling rigs. Permanent platforms within 2000 meters of a VTSS or on or near customary steaming tracks should be shown on charts of the area as well.

- b. One purpose of a VTSS is to provide safe transit of an area with limited course changes required and good targets, both visual and radar, for navigational purposes. The IMO instructions for the establishment and modification of routing systems does allow a slight adjustment of the scheme, either temporary or permanent, in order to clear a drilling area or other obstruction from the lane, if this is necessary. The Eleventh Coast Guard District Port Access Route Study has recommended a change to the Santa Barbara Channel Traffic Separation Scheme by extending its western end to a precautionary zone and pivoting the TSS so that the eastern end near Anacapa Island is relocated approximately one-half mile southward. This will clear the drilling area occupied by the Glomar Coral Sea putting it over 1000 meters from the traffic lane.
3. Where it is a condition of the permit, as it was in this case, to not buoy any anchors in the VTSS, no reference should be made in LNM or other sources to the possibility of lighted buoys in the channel. It is recognized that anchors outside the channel would be so marked and comments could be made to this effect but no reference should be made to buoys in the VTSS where this situation was prohibited as in this case. It is conceivable that the allusion in LNM 9-83 to the potential location of buoys in the channel would cause the passing masters to leave the drillship further to starboard and enter the Separation Zone to avoid this possible danger. It is further recommended that buoys not be permitted in the VTSS, except under extraordinary circumstances.

4. A five hundred meter (500 m) buffer zone adjacent to Traffic Lanes has been recommended by various sources. Based on the results of this study, under certain conditions drilling ships can be temporarily placed in this 500 meter buffer zone for exploratory drilling. This calculated risk is derived by evaluating the movements of some 793 vessels passing the Glomar Coral Sea and the comments received from 92 masters.
  - a. Prevailing and anticipated visibility conditions must be taken into consideration. During foggy and hazy periods visual sighting distance is reduced and danger of collision thus increased. Although the majority of the masters reporting viewed the drillship as a hazard in restricted visibility, and to some extent in clear weather, the drillship was reported to present an excellent radar target in all weather conditions therefore affording ample opportunity to avoid any close quarters situations. It is noted that only 13 (9 of 793) passed within 500 yards of the drillship and only 2 within 250 yards of the stationary vessel.
  - b. Sufficient maneuvering space must be available in the area for transiting ships to take necessary avoiding action in case of multiple ships being present.
  - c. No drillships or platforms should be allowed to be placed in the traffic lanes themselves, as this would reduce the channel width and create an untenable situation for passing traffic with all the support vessels and so forth in the vicinity.
  - d. Obviously, the longer the drillship remains in the buffer zone, the greater the danger of collision with approaching traffic. No place in navigable waters is fail-safe permanently from being struck by another vessel, but for relatively short periods of time this risk should be acceptable.

e. Another area of concern is within four miles of a turn in the channel and especially on the outside of the turn. A close quarters situation could easily result if an oncoming vessel did not turn at the proper time caused by the lack of alertness on part of the watch or not making adjustments in course as necessary in sufficient time after the turn.

5. Every effort should be taken to prevent a "gated" situation where two drillship/platforms are located on opposite sides of the traffic lane, within 1000 meters of the lane edge and with less than two nautical miles horizontal separation. Distances less than these could create a condition calling for several course changes - slalom - thus increasing the danger of collision. The fact that one vessel is moored in the Separation Zone does not in any way diminish this problem. The track lines and the CPA's of the ships passing the Glomar Coral Sea show quite conclusively that the vessels' masters did not consider the Separation Zone inviolate even though the Rules of the Road state that you should enter it only to cross or in case of emergency.
6. Because of the basic requirement of a drillship to be able to move from place to place for exploratory drilling, there is no question that these ships should be equipped with all the necessary navigational instruments and devices, including radars, collision avoidance/early warning devices, VHF and other radio transceivers, lights, whistles, and so forth, as called for by the U.S. Coast Guard. Having the equipment, it must be operated by competent personnel in order to reduce any danger of collision with oncoming traffic.



7. The high percentage of the passing vessels sighting the drillship by radar at least ten miles away indicates the ship presents an excellent target that is not in need of enhancement. A smaller exploratory drillship, on the other hand, might not be so readily radar-visible thus calling for the addition of one or more radar reflectors to ensure an early target acquisition and identification.
8. In Question A2 of the questionnaire 68% of the Masters answering agreed that the drillship was a hazard under conditions of reduced visibility. Color is an important factor in sighting and identification. Studies should be made in the area where a drillship/platform is secured as to whether the vessel should be painted a particular color for ease in visual acquisition. White or international orange are two suggested colors but local conditions can and should govern. Haze or fog reduce the range of visibility of white and orange is enhanced, whereas, in clear weather white would possibly be better.
9. It was noted during this survey that intership communications were not completely satisfactory. Greater effort by the drillship/platform personnel must be undertaken to effect this necessary requirement. It is understood that many--probably most--of the passing vessels had foreign crews but the ship is required by law to have an English-speaking radio operator on board. Proper and early communications will reduce any surprise factor of the oncoming ship sighting and identifying the drillship/platform for what it is--a stationary object--thus unable to maneuver and get out of the way.

10. Unless it is necessary to cross a traffic lane to reach a drillship or platform, every effort must be made by support traffic--crew and supply boats--to remain as far from a VTSS as possible in order not to interfere with traffic therein. When these craft must cross a lane to service a drillship or platform it should be done in a limited area and the support craft should always defer to the ships utilizing the traffic scheme.
  
11. On occasion an overtaking situation would take place near the drillship. Although no problems came from these evolutions, the danger of collision due to possible loss of steering control or other casualty existed and was increased by the mere numbers of vessels. While there is adequate space in the channel if the drillship/platform is at least 500 meters from the channel, any smaller buffer zone could create an unsatisfactory situation and overtaking operations should be limited or curtailed until the vessels are clear of the immediate area.

# APPENDIX A

Tabulation of recorded traffic passing Drillship Coral Sea from 1 March to 14 May 1983 inclusive. (\*Vessel Data Record received.) Code: C - Container, T - Tanker, B - Bulk Carrier, Com - Combination, R - Ro/Ro, TT - Tug & Tow, G - Break Bulk

Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
28 Feb. (Prior to commencement of operations.)	-----*	2040	AXEL JOHNSON (G)	0.8	N	10	-----	N
1 March	3/1*	0230	PRES. JEFFERSON (C)	0.5	Y	0.5	125/35	N
	3/2*	0557	ALMIRANTI STORNI (G)	0.5	N	3	130/38	N
	3/3	1705	SOHIO INTREPID (T)	0.8	N	9	150/26	D
	3/4	1715	JALISCO	0.35	N	9	150/26	D
	3/5*	2330	PACIFIC SUNSHINE (C)	1.0	N	8	140/25	N
2 March	3/6A	0003	(T)	0.4	N	8	140/25	N
	3/6B	0355	TOMSEENA (T)	0.6	Y	10	140/25	N
	3/7	0944	(B)	0.8	N	4	145/18	D
	3/8	1216	(B)	0.6	N	6	145/14	D
	3/9A	1514	(B)	1.3	N	9	0	D
	3/9B	2200	H.M.Y. BRITANNIA (with USCG escort)	0.8	Y	10	083/10	N
3 March	3/10	0500	PHILADELPHIA SUN (T)	1.0	Y	4	055/16	N
	3/11	1006	(C)	0.7	N	2	065/18	D
	3/12	1210	(B)	0.85	N	9	085/6	D
	3/13	1244	SANTA SILVA MARU (B)	0.6	N	9	085/6	D

## APPENDIX A (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
3 March	3/14*	1846	TOREK COMBINER (B)	0.9	N	10	?/15	N
	3/15	1924	(T)	1.8	N	10	260/12	N
	3/16	1942		0.6	N	10	260/12	N
	3/17	2036		1.7	N	10	260/12	N
	3/18	2048		0.8	N	10	260/12	N
	3/19*	2214	VENUS DIAMOND (R)	1.5	N	10	260/12	N
4 March	3/20	2258	KEWAINA (T)	1.3	Y	10	255/15	N
	3/21	2349	ARCO FAIRBANKS (T)	0.4	Y	9	250/18	N
	3/22	0113	COLORADO (T)	1.0	Y	9	250/18	N
	3/23	0250	SIERRA MADRE (T)	0.8	Y	9	250/18	N
	3/24	0458	EXXON BOSTON (T)	1.4	Y	10	290/22	N
	3/25*	0502	MOBIL ARCTIC (T)	1.5	Y	10	290/22	N
	3/26	1105	SEAPAC PRINCETON (C)	0.6	N	15	265/24	D
	3/27	1548	ALKYONO (B)	0.7	Y	10	255/40	D
	3/28	1848	SANTA MAGDALENA (Com)	1.5	Y	10	250/30	N
	3/29	2034	GALLEON TOMALLINA	1.8	Y	9	270/32	N
	3/30*	2245	HIRA MARU (C)	1.0	N	9	270/32	N
	3/31	2243		0.6	N	9	270/32	N
	3/32	2318		1.0	N	9	270/32	N

APPENDIX .. (Cont.)  
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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
4 March	3/33	2334		0.8	N	9	270/32	N
	3/34	2355		1.1	N	9	270/32	N
5 March	3/35	0003	NORWAY (B)	1.0	Y	10	270/25	N
	3/36	0236		0.9	N	10	270/22	N
	3/37	0936	POLYNESIA (B)	0.7	Y	10	270/16	D
	3/38	1856		0.8	N	2	090/4	N
	3/39	1902	EXXON NEW ORLEANS (T)	1.4	Y	2	090/4	N
	3/40	2020		0.8	N	3	090/12	N
	3/41	2203		0.8	N	3	090/12	N
	3/42*	2218	ANTONIA JOHNSON (C)	0.6	N	3	090/12	N
	3/43	2322		0.8	N	10	040/10	N
6 March	3/44	0016		0.7	N	10	040/10	N
	3/45	0329		0.7	N	10	060/5	N
	3/46	0804	(B)	0.8	N	9	260/14	D
	3/47	1039	ARCO TEXAS (T)	0.7	N	9	260/14	D
	3/48	1228	GOLDEN GATE (T)	0.75	Y	15	265/12	D
	3/49	1414	ALEMANIA EXPRESS	0.6	N	12	275/16	D
	3/50	2007	CHEVRON LOUISIANA (T)	1.4	Y	15	250/22	N
	3/51	2037		0.6	N	15	250/22	N

## APPENDIX (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
7 March	3/52	1750	SEALAND EXPLORER(C)	0.8	Y	7	250/20	D
	3/53	1818	(T)	1.7	N	7	250/20	D
	3/54	1955		1.0	N	10	260/22	N
	3/55	2050	(T)	0.5	Y	10	260/22	N
	3/56	2134		0.8	N	10	260/22	N
	3/57	2208		0.4	N	10	260/22	N
	3/58	0037	(TT)	0.9	N	10	260/14	N
8 March	3/59	0138		1.1	N	13	270/11	N
	3/60	0155		1.0	N	13	270/11	N
	3/61	0420	ATIGUN PASS (T)	0.7	Y	15	280/8	N
	3/62	1105	POTOMAC (T)	1.3	N	7	300/18	D
	3/63	1114	CHEVRON WASHINGTON (T)	1.2	N	7	300/18	D
	3/64	1232	EXXON JAMESTOWN (T)	0.5	Y	7	300/18	D
	3/65	1324	(B)	1.2	N	7	300/18	D
9 March	3/66	1359	PECOS (T)	1.0	Y	12	270/20	D
	3/67*	1415	ASIA MARU (C)	1.5	Y	12	270/20	D
	3/68	1617	PRINCE WILLIAM SOUND	0.8	N	12	270/20	D
	3/69*	2057	REGENT CEDAR (R)	0.9	N	12	250/22	N
	3/70	0421		0.7	N	12	240/22	N

## APPENDIX .. (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
9 March	3/71	1000	(C)	1.1	N	5	270/10	D
	3/72	1108	AMERICAN MONARCH	0.8	Y	12	260/16	D
	3/73	1131	(G)	0.8	N	12	260/16	D
	3/74	1813	CHEVRON OREGON (T)	1.2	Y	10	260/22	D
	3/75	2000	(TT)	1.2	N	10	260/22	N
	3/76	2242	(T)	0.7	N	10	250/22	N
	3/77	2341		1.0	N	10	250/22	N
10 March	3/78	0121		1.0	N	10	250/25	N
	3/79*	0232	JAPAN ACE (C)	1.6	N	10	255/25	N
	3/80	0436	(G) (Medium)	0.6 mi North	N	12	255/15	N
	3/81	1333	SUO MARU	0.9	N	8	270/22	D
	3/82	1700	AMERICAN COMMANDER (TT)	1.0	Y	8	270/8	D
	3/83	2005	(TT)	2.2 mi North	N	10	255/20	N
	3/84	2010	(C)	1.0	N	10	255/20	N
11 March	3/85	2038	(T)	0.8	N	10	255/20	N
	3/86	2221	PHILADELPHIA SUN (T)	1.1	Y	10	255/20	N
	3/87	0008		1.1	N	8	245/16	N
	3/88	0040	FOSS (TT)	0.8	Y	8	245/16	N
	3/89	0255		2.0	N	8	255/16	N

## APPENDIX .. (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
11 March	3/90	0521	(T) (Large)	1.0	N	8	250/16	N
	3/91	1338	PACIFIC CHALLENGER(TT)	0.9	Y	15	260/15	D
	3/92	1432	HIEI MARU(G)	0.45	N	15	260/23	D
	3/93	2048	(C) (Medium)	1.0	N	12	250/25	N
	3/94	2232	(T) (Very large)	1.2	N	15	260/18	N
12 March	3/95	0007	(T) (Med-small/foreign)	0.3	Y	12	260/18	N
	3/96*	0239	VISHVA PARAG(G) (Small)	1.0	Y	12	260/18	N
	3/97	0848	COLORADO (T)	0.7	Y	8	260/10	D
	3/98	0856	ZIM SAVANNAH(C)	0.3	N	8	260/10	D
	3/99	0914	SOPHIE FIRST(G)	0.6	N	8	260/10	D
13 March	3/100	1010	BARNEY DE FELICE(TT)	1.2	Y	8	260/10	D
	3/101	1040	COCHISE(TT)	0.9	Y	15	260/12	D
	3/102	1037	(C) (KS Lines)	1.1	N	15	260/12	D
	3/103	1111	SHERENE(G)	0.5	N	15	260/12	D
	3/104	2018		1.0	N	10	270/18	N
	3/105	0516	(T) (Small)	1.3	N	12	275/22	N
	3/106	0556	(C) (Large) (K Line)	0.8	N	12	275/22	D
	3/107	0607	MALACCA MARU(C) (Small)	0.7	N	12	275/22	D
	3/108		(NO TARGET DESIGNATED.)					



## APPENDIX A (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
13 March	3/109	0927	ANCO CHAMPION	0.6	N	12	275/18	D
	3/110	0929	DAWN (T) (Chem)	0.6	Y	12	275/18	D
	3/111	1016	WELLINGTON STAR (G)	0.8	Y	12	275/18	D
	3/112	1047	EVER SUMMIT	0.55	N	10	160/8	D
	3/113	1047	SARITA	0.9	Y	10	160/8	D
	3/114	1050	NGAN CHAU	0.6	N	10	160/8	D
	3/115	1432	CECIL H. GREENE (Seismic)	0.5 North	Y	1.2	0	Rain
14 March	3/116	1607	ELBE EXPRESS (C)	0.5	N	1.0	0	Rain
	3/117	2227	CHEVRON OREGON (T)	1.1	Y	10	265/28	N
	3/118	2218	(C) (Medium)	0.7	Y	10	265/28	N
	3/119	2320	(T) (Large)	0.8	N	12	270/35	N
	3/120	0627	TYSEN LYKES	1.2	Y	12	280/30	D
	3/121	1101	EXXON LEXINGTON	0.9	Y	20	280/22	D
	3/122	1130	(C)	0.9	N	20	280/22	D
15 March	3/123*	1521	YAMASHIN MARU (C) (Small)	1.5	N	20	260/16	D
	3/124	2121	(C) (Medium)	0.6	N	12	260/28	N
	3/125*	2335	SEA AUGUSTA (G)	1.0	N	12	260/26	N
	3/126A	0253	(G)	1.2	N	12	040/8	N

APPENDIX A (Cont.)  
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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
15 March	3/126B	2039	PRES. ROOSEVELT (C)	1.0	Y	15	050/5	N
	3/127	2144	(G) (Medium-small)	1.0	Y	15	050/5	N
	3/128	2217	(G) (Medium)	0.7	N	15	050/5	N
16 March	3/129	0014	(T) (Medium)	0.8	N	15	0	N
	3/130	0222	(T) (Medium)	0.5	N	15	050/10	N
	3/131	0515	(T) (Small)	1.3	N	12	050/10	N
	3/132	0754	CHEVRON WASHINGTON (T)	0.9	Y	15	090/4	D
	3/133	0759	THAMES MARU (G)	0.8	N	15	090/4	D
	3/134	1355	KEYSTONE (T)	1.1	Y	6	160/16	D
	3/135	1953	(Medium size)	1.0	N	8	050/20	N
	3/136*	2305	FERNCROFT (Med-small)	1.1	N	10	060/20	N
17 March	3/137	0100	(C) (Medium-large)	0.3	N	10	060/20	N
	3/138*	0258	IMPERIAL SKEENA (T) (Small)	1.2	N	12	050/8	N
	3/139*	0311	KISO MARU (C)	0.9	N	12	050/8	N
	3/140	0351	(C) (Medium)	0.9	N	12	050/8	N
	3/141*	0713	EARNEST VENTURE (G)	0.6	N	12	0	D
	3/142	1353	CHEVRON COLORADO (T)	0.8	Y	10	260/8	D
	3/143	1519	PACIFIC TITAN (TT)	1.0	Y	10	260/8	D
	3/144*	1917	BRIMANGER (T) (Medium)	1.2	N	18	260/14	N

## APPENDIX A (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
17 March	3/145	2130	(C) (Medium)	0.8	N	10	290/14	N
	3/146	2342	(G) (Medium-small)	0.8	N	12	0	N
	3/147	2343	(T) (Med-large) (Overtaking)	1.0	N	12	0	N
	3/148	0324	(T) (Med-small) (Exxon)	0.4	N	8	250/8	N
18 March	3/149	0831	MARACAIBO MARU (T)	0.8	N	10	0	D
	3/150	1004	BEAUTEIOUS (B)	0.8	N	10	0	D
	3/151	1451	SIRIUS (G)	0.6	N	20	240/8	D
	3/152	1541	TAI CHUNG (B)	0.5	Y	20	240/8	D
	3/153	1555	YOUNG SPLENDOR (R)	0.6	N	20	240/8	D
	3/154	1731	(T) (Medium)	2.2	N	20	240/10	D
	3/155*	2034	TAMA MARU (R)	2.2	N	12	260/11	N
	3/156	2103	(T) (Medium-large)	0.9	N	12	260/11	N
	3/157	2155	(G) (Medium-small)	0.8	N	12	260/11	N
	3/158	2321	AMERICAN MARKETER	0.5	Y	8	000/7	N
	3/159	2358	(T) (Large)	1.0	N	8	000/7	N
	3/160	0059	(G) (Large)	0.5	N	8	000/7	N
19 March	3/161	0305	(TT)	1.6	N	15	040/9	N
	3/162	0516	(C) (Medium)	1.0	N	15	050/10	N
	3/163	0752	EXXON NEW ORLEANS (T)	0.8	Y	15	050/6	D

## APPENDIX A (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
19 March	3/164	2024	(T) (Medium-large)	1.3	N	12	260/28	N
	3/165	2030	SEALAND DEFENDER (C)	2.0	N	12	260/28	N
	3/166	2124	(G) (Small)	0.8	N	12	260/28	N
	3/167	2305	(C) (Medium)	0.8	N	12	060/8	N
	3/168	2329	(G) (Medium)	0.5	N	12	060/8	N
20 March	3/169	0005	(Medium-large)	0.5	N	12	060/8	N
19 March	3/170	2346	(Medium-small)	1.1	N	12	060/8	N
20 March	3/171	0138	(G) (Large)	1.0	N	12	060/8	N
	3/172	0322	(T) (Small)	1.6	N	12	0	N
	3/173	0451	(T) (Medium-small)	0.5	N	10	050/14	N
	3/174	0935	COLORADO (T)	0.6	N	10	060/10	D
	3/175	1350	MANJIN INCHON (C)	1.5	N	10	160/10	D
	3/176	1414	TEXACO MINNESOTA (T)	1.1	Y	10	160/10	D
	3/177	1417	HARUNA MARU (C)	0.5	N	10	160/10	D
	3/178	1951	(Medium-large)	0.6	N	8	140/10	N
	3/179	2002	SIERRA MADRE	0.8	Y	8	140/10	N
	3/180	2203	(T) (Medium-large)	0.8	N	8	140/10	N
	3/181	2149	(T) (Medium-large)	1.2	N	8	140/10	N
21 March	3/182	0448	(T) (Small)	0.6	N	10	270/14	N

APPENDIX A (Cont.)  
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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
21 March	3/183	0821	ARCO ALASKA (T)	0.5	Y	15	240/20	D
	3/184	0856	NEPTUNE JADE (C)	0.9	Y	15	240/20	D
	3/185	1301	JINGBON (G)	0.3	N	15	260/29	D
	3/186	1651	LAFAYETTE	1.0	N	12	260/30	D
	3/187	1947	(T) (Large)	0.7	N	12	270/28	N
	3/188	1944	(Com) (Small)	2.0	N	12	270/28	N
	3/189	2024		1.0	N	12	270/28	N
	3/190	2330	(G) (Medium-small)	1.0	N	12	260/24	N
	3/191	0048	(Medium-large)	1.2	N	12	260/24	N
22 March	3/192	0108	(T) (Large)	0.7	N	12	260/24	N
	3/193	0051	(C) (Medium-large)	1.0	N	12	260/24	N
	3/194	0248	(TT)	1.3	N	12	270/24	N
	3/195	0239	(G) (Medium-small)	0.5	N	12	270/24	N
	3/196	0412	(T) (Medium-large)	1.1	N	12	270/24	N
	3/197	0533	(C) (Medium)	1.1	N	12	260/20	N
	3/198	0559	TEXACO NEW JERSEY (T) (Small)	1.0	N	12	260/20	D
	3/199	0842	AMERICAN SUN (T)	1.0	Y	12	260/6	D
	3/200	1028	EXXON WASHINGTON (T)	0.7	Y	4	150/4	D
	3/201	1808	CLIFFORD MAERSK	0.8	Y	10	070/10	D

## APPENDIX (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
22 March	3/202	1958	(G) (Medium)	0.6	N	10	260/14	N
23 March	3/203	0047	(Medium-small)	0.8	N	10	270/22	N
	3/204	0236	(TT)	1.5	N	12	270/24	N
	3/205	0323	(Medium)	1.3	N	12	270/24	N
	3/206	0750		1.5	N	12	260/20	D
	3/207	0817	POTOMAC (T)	0.7	N	12	260/15	D
	3/208	1051	BESSENGEN (C)	0.8	Y	12	250/6	D
	3/209	1303	PRES. LINCOLN (C)	0.9	N	12	250/6	D
	3/210	1327	YAMOKI MARU (B)	0.7	N	12	250/6	D
	3/211*	1802	UNIDO (G)	1.0	Y	7	130/10	D
	3/212	2120		1.1	Y	0.5	035/38	N
	3/213	2129		2.1	N	0.5	035/38	N
	3/214	2139		1.4	N	0.5	035/38	N
24 March	3/215	0031	(Japanese vessel)	0.7	Y	10	320/24	N
	3/216	0215	(Greek vessel)	0.9	Y	12	260/20	N
	3/217*	0635	TT MARYLAND (T)	1.0	N	15	280/12	D
	3/218	1109	LAMTONG CHAU (C)	1.0	N	12	280/22	D
	3/219	1225	CHEVRON OREGON (T)	1.05	Y	12	280/22	D
	3/220	1801	WEST SUNDAL (B)	0.75	N	15	285/38	D

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
24 March	3/221	2330	(Medium size)	1.7	N	12	270/38	N
	3/222	2352	(Large)	1.2	N	12	270/38	N
25 March	3/223	(NO TARGET DESIGNATED.)						
	3/224	0104		0.9	N	12	270/38	N
	3/225	0139	B.T. SAN DIEGO (T)	1.3	Y	12	280/35	N
	3/226	0524	(R)	0.7	N	14	270/32	N
	3/227	0720	LION OF CALIFORNIA (T)	0.7	Y	14	260/31	D
	3/228	0745	(C)	1.1	N	14	260/28	D
	3/229	1030	AMERICAN TRADER (C)	1.1	N	14	265/27	D
	3/230	1047	CHEVRON COLORADO (T)	1.0	N	14	265/27	D
	3/231	1224	ASAKAZE (T)	0.8	N	14	265/30	D
	3/232	1450	ALADIN STAR (B)	0.8	N	10	265/30	D
	3/233A*	1444	HAKUSAN MARU (C)	1.3	N	10	265/30	D
	3/233B	2356		0.9	N	12	280/22	N
26 March	3/234	0027		1.1	N	12	280/22	N
	3/235*	0508	SANTA CRUZ II	0.5	Y	10	060/10	N
	3/236	0618	LAGUAJARA (B) (Small)	0.7	N	10	060/10	D
	3/237	0618	KRANJ (G) (Small)	0.5	Y	10	060/10	D
	3/238	0633	CEMPEC 2 (G) (Small)	0.4	N	10	060/10	D

## APPENDIX A (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
26 March	3/239	0913	HOHSING ARROW(B) (Small)	0.6	N	12	060/2	D
	3/240	0937	FUSING MARU(T) (Small)	0.6	N	12	060/2	D
	3/241*	1026	STOLT INTEGRITY(T)	1.35	N	13	0	D
	3/242	1052	JUPITER NO. 1(G)	1.3	N	14	0	D
	3/243	1246	SEALAND MARINER(C)	0.6	N	14	0	D
	3/244	2011	(B) (Very large)	1.1	N	12	260/22	N
	3/245	2028		1.1	N	12	260/22	N
	3/246*	2155	CARIBBEAN HIGHWAY (R)	1.0	N	12	265/22	N
	3/247*	2226	SHIN-KASHU MARU	1.0	N	12	250/20	N
	3/248	0129		0.9	N	12	260/15	N
27 March	3/249	0824	(B) (Large)	1.0	N	12	0	D
	3/250	0843	HOEGH MERCHANT(C)	0.3	N	12	0	D
	3/251	0906	STAR MAGNATE(C)	0.4	N	12	0	D
	3/252	0930	EKVATOR	0.4	N	12	0	D
	3/253	1119	ALSTER EXPRESS(C)	0.7	N	20	255/10	D
	3/254	1436	MOBIL OIL(T)	1.2	Y	20	235/14	D
	3/255	1509	CYRSTAL STAR(B)	0.9	N	20	235/14	D
	3/256	2204	(B) (Large)	0.7	N	8	055/8	N
	3/257	2219	(C)	1.0	N	8	055/8	N



APPENDIX A (Cont.)  
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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
27 March	3/258	2251	(VLCC)	1.0	N	10	270/20	N
	3/259	2326	(Small ship)	1.6	N	10	270/20	N
28 March	3/260	0116	(TT)	1.3	N	10	270/20	N
	3/261	0058	(C)	1.0	N	10	270/20	N
	3/262	0946	COLORADO (T)	0.6	N	15	255/8	D
	3/263	1049	TEMSE (B)	0.35	N	15	260/14	D
	3/264	1120	EXXON BALTIMORE (T)	0.4	Y	15	260/14	D
	3/265	1124	(C)	0.8	N	15	260/14	D
	3/266	1619	USCGC 625	0.8	N	15	255/18	D
	3/267	1706	KIWALAN (B)	0.3	N	15	220/24	D
	(See end of report) ARABELLA							
	3/268*	2305	CLOVER (G)	1.2	N	12	295/16	N
	3/269	2332	(T)	1.1	N	12	295/16	N
29 March	3/270	0155	KEYSTONE CANYON (T)	0.8	N	12	325/8	N
	3/271	0230	(TT)	0.7	N	12	325/8	N
	3/272	0646	PRES. JEFFERSON (C)	1.3	N	12	260/8	D
	3/273	1016	EVER VICTORY (C)	0.9	N	12	0	D
	3/274	1121	SEAPAC LEXINGTON (C)	0.6	N	15	260/10	D
	3/275	1524	(B) (Small)	1.1	N	15	280/14	D

## APPENDIX A (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
29 March	3/276	1600	TEXACO GEORGIA (T)	1.1	N	15	280/14	D
	3/277	2216		0.8	N	10	250/22	N
30 March	3/278*	0008	NEPTUNE DIAMOND (R)	1.2	N	12	250/24	N
	3/279	0009		0.7	N	12	250/24	N
	3/280	0446		1.0	N	12	260/18	N
	3/281	1005	CHEVRON OREGON (T)	0.8	N	12	260/18	D
	3/282	1638	MITSUBI MARU (B)	0.45	N	12	255/24	D
	3/283	2101		0.45	N	10	260/30	N
	3/284	2238		0.4	N	12	255/32	N
	3/285	2319	(B) (Large)	0.125	N	12	255/33	N
	3/286	2346	(B)	0.5	N	12	250/34	N
31 March	3/287	0120		0.6	N	12	250/34	N
	3/288	0518	(C) (Small)	1.2	N	4	040/4	N
	3/289	1838	(G)	0.8	N	6	250/34	D
	3/290	1915		1.1	N	7	250/32	N
	3/291	1942		0.9	N	8	250/31	N
	3/292	2109		1.3	N	10	260/24	N
	3/293	2124		1.3	N	10	260/24	N
	3/294	2206	(C)	1.0	Y	10	260/21	N

## APPENDIX A (Cont.)

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Page	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
31 March	3/295	2334		0.5	N	10	260/16	N
1 April	4/1	0154	(T)	0.5	N	11	255/14	N
	4/2	0257	(C)	1.4	N	12	250/14	N
	4/3	0312		1.4	N	12	250/14	N
	4/4	1022	NEW APOLLO (B)	0.4	N	10	275/12	D
	4/5	1049	RUNER EXPRESS (C)	0.5	N	10	275/12	D
	4/6	1152	GREEN ISLAND (C)	0.4	N	10	275/12	D
	4/7*	1223	SHOSHIN MARU (B)	0.5	N	10	275/12	D
	4/8	1926	SANTA MARIANA (Com)	1.0	Y	12	255/17	N
	4/9	2230		0.6	N	12	255/14	N
	4/10	2237		0.8	N	12	255/14	N
	4/11	2326		0.7	N	12	250/16	N
	4/12*	2339	LLOYD ARGENTINA (C)	1.5	N	12	250/16	N
2 April	4/13	0024		0.8	N	12	250/16	N
	4/14	0040		0.6	N	12	250/16	N
	4/15	0219		1.2	N	12	250/26	N
	4/16	0319		0.45	Y	12	250/26	N
	4/17	0927	ETERNAL FUJI (C)	0.7	N	12	244/18	D
	4/18*	1243	SEALAND PATRIOT (C)	1.2	Y	6	255/35	D

## APPENDIX A (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
2 April	4/19	1449	BAJA (B)	0.9	Y	7	250/38	D
	4/20	1616	EXXON NEW ORLEANS (T)	0.6	N	7	255/35	D
	4/21*	1739	CRYSTAL REED (B)	0.8	N	7	265/28	D
	4/22*	2033	SUZUKASAN MARU (R)	0.7	N	7	280/30	N
	4/23	2103		0.85	N	7	280/30	N
	4/24	2221		0.8	N	7	280/25	N
	4/25	2311		0.65	N	8	270/20	N
3 April	4/26	2328	POTOMAC (T)	1.5	N	10	260/14	N
	4/27	0225	(TT)	1.9	N	12	280/8	N
	4/28	0300		0.4	N	12	280/8	N
	4/29	0329		0.8	N	12	280/8	N
	4/30	1234	(C)	0.8	N	12	260/34	D
	4/31	1354	PACIFIC JAPAN (C)	1.1	N	11	280/32	D
	4/32	1454	EXXON HOUSTON (T)	0.6	Y	11	280/32	D
4 April	4/33	2345		0.5	N	10	290/20	N
	4/34	0036		0.9	N	10	290/20	N
	4/35	0502		1.1	N	14	320/16	N
	4/36	1004	CHARLES LYKES (R)	0.7	N	15	250/18	D
	4/37	1321	TEXACO GEORGIA (T)	0.95	N	15	250/20	D

## APPENDIX A (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
4 April	4/38	1914		0.6	N	15	250/23	N
	4/39	1948		0.8	N	18	250/22	N
	4/40	2223		0.85	N	15	250/15	N
	4/41	2337		0.6	N	10	040/12	N
5 April	4/42	0412		1.6	N	10	040/16	N
	4/43	0958	SUNRISE OCEAN(B) (Small)	0.3	N	13	100/10	D
	4/44	1033	NEPTUNE AMBER(C)	0.6	N	13	100/10	D
	4/45	1224	HARBOUR BRIDGE(C)	0.7	N	15	130/6	D
	4/46	1326	EXXON BOSTON(T)	0.7	N	15	135/20	D
6 April	4/47	0057		0.9	N	10	0	N
	4/48	0535	CAPELLA(T)	0.7	N	12	0	D
	4/49	0647	(B)	1.0	N	12	0	D
	4/50*	1019	FLORES(G)	1.2	N	10	0	D
	4/51	1026	WESER EXPRESS	0.9	N	10	0	D
	4/52	1144	GALPARA (LPG)	0.5	N	12	270/16	D
	4/53	1301	CARPAPER(G) (Small)	0.5	N	13	270/16	D
	4/54	2109	(T) (Medium-large)	0.9	N	12	260/22	N
	4/55	2308		0.6	Y	12	260/18	N

## APPENDIX A (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
6 April	4/56	2334		0.7	N	12	260/16	N
	4/57	2326		1.2	Y	12	260/16	N
7 April	4/58	0031	(G) (Medium-small)	0.8	N	12	260/16	N
	4/59	0138	(Medium size)	0.9	N	12	0	N
	4/60	0637	COAST RANGE (T)	0.9	N	12	0	D
	4/61*	0940	NEDLLOYD KEMBLA (G)	0.5	Y	12	270/10	D
	4/62	1732	(T)	1.7	N	10	240/25	D
	4/63	1853		0.6	Y	10	240/25	D
	4/64	2202		0.8	N	12	240/18	N
	4/65	2148		1.5	N	12	240/18	N
	4/66	2247		0.8	N	12	250/15	N
	4/67*	2245	EVERSPRING (C)	1.0	N	12	250/15	N
8 April	4/68	0018	(Small)	1.5	N	12	260/12	N
	4/69*	0100	ASIA OHILHO (G)	1.0	N	12	260/12	N
	4/70	0116	(T) (Large)	0.9	N	12	260/10	N
	4/71	0148	(T) (Large)	0.9	N	12	260/5	N
	4/72	0623	ARCO ALASKA (T)	0.8	N	12	260/10	D
	4/73	0802	PRESIDENT TYLER (C)	0.9	N	10	090/6	D
	4/74	0903	LUNA MAERSK (C)	1.0	N	10	090/6	D

APPENDIX A (Cont.)  
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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
8 April	4/75	1241	EXXON PHILADELPHIA (T)	0.6	N	6	140/13	D
	4/76	1245	(C)	1.7	N	6	140/13	D
	4/77	1346	ANNIVERSARY THISTLE (B)	0.6	N	8	260/10	D
	4/78*	1813	MOBIL ARCTIC (T)	0.8	N	8	240/16	D
	4/79*	1947	OCEAN DUKE (B)	0.7	N	8	240/17	D
	4/80	2348	(Reversed course to avoid traffic.)	1.5	N	12	240/16	N
	4/81	0005		1.0	N	12	240/16	N
	4/82	0049	(G) (Medium)	1.0	N	12	240/15	N
9 April	4/83	0150	(Medium-small)	1.7	N	12	010/10	N
	4/84	0326	(G) (Medium)	0.8	N	12	010/10	N
	4/85	0544	WECCOVA - (Research)	0.6	N	8	030/10	D
	4/86	0904	SEALAND EXPLORER (C)	1.0	N	8	060/7	D
	4/87	1120	(G)	1.0	N	8	240/8	D
	4/88	1301	KEMORO (C)	0.6	Y	8	250/10	D
	4/89*	1700	ANIARA (SGPY) (R)	1.0	N	12	270/16	D
	4/90	1701	TOYOTUJI NO. 7 (R)	0.6	N	12	270/16	D
	4/91	1951	(T)	1.3	N	12	240/15	N
	4/92	2210		1.2	N	12	240/15	N

## APPENDIX A (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
10 April	4/93	0007	TECUMSEH (TT)	1.1	Y	12	240/12	N
	4/94	0008	(T)	0.6	N	12	240/12	N
	4/95	0208	(Medium size)	0.9	N	12	260/10	N
	4/96*	0323	OVERSEAS BOSTON (T)	1.0	N	12	260/10	N
	4/97	0419	SIERRA MADRE (T)	0.8	Y	12	260/8	N
	4/98	0600	MOBIL OIL (T)	1.8	N	10	260/10	D
	4/99	0901	STAVROULA (B)	0.6	N	10	260/10	D
	4/100	1036	VERMILION HIGHWAY (R)	0.9	N	10	260/10	D
	4/101	1641		0.5	N	10	260/20	D
	4/102	1950		0.6	N	12	270/20	N
11 April	4/103*	2005	SIENA (G)	1.5	N	12	270/20	N
	4/104	2330		1.0	N	12	270/30	N
	4/105	0336	(T) (Large)	1.2	N	15	270/30	N
	4/106	0606	MING OCEAN (C)	1.3	N	12	280/26	D
	4/107	0633	CRISTOBAL MARU (G)	1.0	N	12	280/26	D
	4/108	1901	(C)	0.7	N	15	250/30	N
	4/109	2005		0.7	N	15	270/26	N
	4/110	2151		1.1	N	15	270/26	N
	4/111	2228		1.1	N	15	270/23	N



APPENDIX A (Cont.)  
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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
11 April	4/112*	2337	SANTA MERCEDES (Com)	1.2	N	15	270/20	N
12 April	4/113	0012	TONSINA (T)	0.8	Y	15	270/20	N
	4/114	0116	(G) (Medium)	0.7	N	14	270/23	N
	4/115	0057	APL (C)	0.5	N	14	270/23	N
	4/116	0254	(T) (Large)	1.2	N	12	270/26	N
	4/117	0322	(T) (Small)	1.0	N	12	270/26	N
	4/118	0351	(T) (Large)	1.0	N	12	270/26	N
	4/119	0944	HAKONE MARU (C)	0.9	N	12	270/36	D
	4/120	1132	GONO MARU (T)	0.8	N	12	270/36	D
	4/121	1912	WESTERN HORIZONS	1.0	Y	8	270/38	N
	4/122	1920		0.9	N	8	270/38	N
	4/123	2042		0.4	N	8	280/30	N
	4/124*	2324	SEVENSEAS HIGHWAY	1.4	N	10	270/30	N
13 April	4/125	0012		1.0	N	10	270/30	N
	4/126	0419	(G) (Large)	0.9	N	12	050/6	N
	4/127	0432	(T) (Large)	1.0	N	12	050/6	N
	4/128	0539	(B)	1.0	N	12	060/9	D
	4/129	0653	REGENT CEDAR (R) (From Pt. Hueneme)	0.8	N	12	060/9	D
	4/130	0654	PRESIDENT MADISON (C)	0.6	N	12	090/9	D

APPENDIX A (Cont.)  
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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
13 April	4/131*	0927	ASIA NO. 14 (G)	0.7	N	12	090/5	D
	4/132	1020	(C)	1.5	N	12	090/5	D
	4/133	1036	GLOBAL CHALLENGE (G)	0.7	N	12	090/5	D
	4/134	1653	JAWARA (B)	0.6	Y	12	250/16	D
	4/135	1727	(T) (Small)	1.4	N	12	250/16	D
	4/136*	2034	DAISHIN MARU (R)	1.5	N	15	270/8	N
	4/137	2118		0.5	N	15	270/8	N
	4/138	2129		0.8	N	15	270/8	N
14 April	4/139	2136		1.6	N	15	270/8	N
	4/140	0042	(TT) (Abeam to port)	1.4	N	15	250/10	N
	4/141	0358	(Medium-large)	0.8	N	12	060/11	N
	4/142	0654	COLORADO (T)	0.7	N	12	050/10	D
	4/143	0824	PAN NOVA (B)	0.6	N	12	0	D
	4/144	0836	OCEAN GINO (G)	0.8	N	12	0	D
	4/145	0954	ACCORD (C)	0.7	N	12	0	D
	4/146A*	1002	PACIFIC TRADER (C)	0.7	N	12	0	D
	4/146B	1529	ERIMO (G)	0.7	N	10	270/10	D
	4/147	1633	ARCO JUNEAU (T)	0.8	N	10	270/13	D
	4/148	1958		0.6	N	11	270/14	N

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
14 April	4/149	2135	GUARDIAN(TT) (Abeam to port)	1.1	N	12	270/10	N
	4/150	2154	COAST GUARD CUTTER	0.5	N	12	270/10	N
	4/151	2129	(Merchant ship)	1.5	N	12	270/10	N
	4/152	2140	(Merchant ship)	0.6	N	12	270/10	N
	4/153	2249		0.5	N	12	270/9	N
15 April	4/154	0002	(Research vessel)	0.5	N	12	270/7	N
	4/155	0522	ARCO INDEPENDENCE(T)	0.9	N	10	050/8	D
	4/156	0659	PAN EXPRESS (G)	0.6	N	10	050/8	D
	4/157	1107	(C)	0.6	N	12	270/8	D
	4/158	1258	(Chevron T)	1.0	N	12	270/8	D
	4/159	1650	POTOMAC(T)	0.9	N	12	260/16	D
	4/160	2104		1.0	N	12	290/11	N
	4/161	2126		1.0	N	12	290/11	N
	4/162	2146		1.2	N	12	290/10	N
	4/163	2150		0.5	N	12	290/10	N
	4/164	2158	(Maneuvered to avoid fishing vessel.)	0.8	N	12	290/10	N
	4/165	2205		0.4	N	12	290/10	N
	4/166	2216		1.1	N	12	290/8	N

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
15 April	4/167	2302		1.2	N	12	290/6	N
16 April	4/168	0325	(T) (Large)	0.8	N	15	300/6	N
	4/169	0633	NORDVARD (B)	1.3	N	10	320/6	D
	4/170	0904	PRESIDENT FILLMORE (C)	0.8	N	12	0	D
	4/171	1100	TORRENT	0.5	N	12	0	D
	4/172	1300	(G)	1.5	N	11	0	D
	4/173	1324	(C)	0.7	N	11	0	D
	4/174	1727	SKAUBORD (R)	0.8	N	8	0	D
	4/175	2224		0.8	N	10	070/5	N
17 April	4/176	0110	(Medium-large)	1.1	N	10	080/8	N
	4/177	0445	(T)	0.8	N	8	100/4	N
	4/178	0709	(TT)	0.6	N	9	110/5	D
	4/179	0709	HOEGH MALLARD (C)	1.0	N	10	110/5	D
	4/180	1051	COLUMBIA STAR (C)	0.8	N	10	090/8	D
	4/181	1304	KENAI (T)	0.5	N	10	080/10	D
	4/182	1725	MARINE CHEMIST (T)	0.7	N	10	120/28	D
	4/183	2007		1.0	N	6	120/26	N
	4/184	2050		1.2	N	3	120/26	N

## APPENDIX A (Cont.)

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
17 April	4/185	2126		0.7	N	3	120/26	N
	4/186	2338	(TT)	0.4	N	1	130/16	N
	4/187A	2221		1.3	N	3	120/20	N
	4/187B	2329	(T)	0.2	Y	1	130/16	N
	4/188	2332		0.7	N	1	130/16	N
18 April	4/189	2358	(C)	0.3	N	1	130/16	N
	4/190	0601	ELBHOFF (C)	0.4	N	8	160/10	D
	4/191	0927	CO-OP GRAIN (B)	0.7	N	8	220/12	D
	4/192	1046	NEW CHINA (G)	0.7	N	8	210/12	D
	4/193	1918		0.6	N	3	110/6	N
	4/194	2126	PACIFIC VENTURE	0.5	N	3	100/8	N
	4/195*	2141	SAGAMI MARU (R)	0.6	N	3	100/8	N
	4/196	2153		0.9	N	3	100/8	N
	4/197	2358		0.6	N	10	120/14	N
	4/198*	0459	GERDT OLDENDORFF (G)	0.7	Y	10	090/10	N
19 April	4/199	0946	ARCO TEXAS (T)	1.0	N	8	120/12	D
	4/200	1010	(TT)	1.2	N	8	120/13	D
	4/201*	1045	RIO TEVCO (G)	1.0	N	8	120/14	D
	4/202	1552	ARCO SPIRIT (T)	0.4	Y	10	150/20	D
	4/203	1553	EXXON NEW ORLEANS (T)	1.1	Y	10	150/20	D

APPENDIX A (Cont.)  
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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
19 April	4/204*	2045	MEDCA (Sjuf) (T)	1.0	N	6	145/24	N
	4/205	2148		0.9	N	6	145/18	N
	4/206	2316		0.8	N	10	145/5	N
20 April	4/207	0009	GULF KNIGHT (T)	0.9	Y	12	0	N
	4/208	0142	(T) (Medium-large)	0.6	N	10	120/8	N
	4/209	0344	(C)	1.0	N	8	120/10	N
	4/210	0537	TEXACO GEORGIA (T)	0.6	N	10	120/10	D
	4/211	0633	JEN EL MARU (T)	0.8	N	10	120/10	D
	4/212	0819	WORLD FINANCE (B)	0.7	N	10	145/15	D
	4/213	0940	GONG SUN (G) (Small)	0.25	N	8	150/12	D
	4/214	1038	HAUIN PASHIO (?) (C)	1.0	N	8	155/12	D
	4/215	1619	(R)	0.5	N	8	150/12	D
	4/216	1822	ALASKAN MARU (T)	0.7	N	12	145/14	D
	4/217	2049		0.7	N	12	180/10	N
	4/218	2151		0.6	N	12	190/8	N
	4/219	2227		0.18	N	11	195/7	N
	4/220*	2340	SARGODHA (G)	0.65	N	10	210/5	N
21 April	4/221	0010		0.6	N	10	210/4	N
	4/222	0041		1.0	N	10	210/4	N

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir., Vel.)	Day/Night
21 April	4/223	0211		1.0	N	10	210/2	N
	4/224	0347		1.2	N	10	0	N
	4/225	0414		0.5	N	10	0	N
	4/226	0510	MARILYN(G) (Small)	0.25	Y	10	020/6	D
	4/227	0658	BRIGHT AGE(R)	0.5	N	10	020/8	D
	4/228	1021	CHIZURABA MARU(T)	0.9	N	10	265/6	D
	4/229	1307	PALAWAN ISLAND(R)	0.3	N	12	275/16	D
	4/230	1429	TAMA REX(G)	0.35	N	12	250/25	D
	4/231	2117		1.05	N	15	245/27	N
	4/232	2202		0.45	N	18	245/27	N
22 April	4/233	2222		0.8	N	18	245/27	N
	4/234	2252		0.55	N	18	245/27	N
	4/235	0009		0.6	N	20	245/28	N
	4/236	0107		1.0	N	15	245/23	N
	4/237	0304	(TT)	0.6	Y	10	250/14	N
	4/238	0513	GAMBIT SUCCESS(G)	0.45	N	10	230/16	D
	4/239	0659	COLORADO(T)	1.0	N	10	230/16	D
	4/240	0903	BAY RIDGE(T)	0.5	Y	10	250/15	D
	4/241	1015	HAKUSAN MARU(C)	0.6	N	10	260/15	D

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
22 April	4/242	1200	PRESIDENT WASHINGTON(C)	0.65	N	10	270/14	D
	4/243	1958		0.35	N	10	260/19	N
	4/244	2130		1.0	N	10	260/12	N
	4/245*	2136	GAUPON TOURMAUNE(?)	1.1	N	10	260/12	N
	4/246	2340		0.75	N	10	260/12	N
	4/247	2329		0.8	N	10	260/12	N
	4/248	0327	(TT)	1.1	N	10	260/14	N
23 April	4/249	0319	(Small boat)	0.4	N	10	260/14	N
	4/250	0546	(C)	1.4	N	10	260/10	D
	4/251	0851	USCGC MIDGETT 726	0.5	Y	11	0	D
	4/252	1312	SEALAND DEFENDER(C)	0.7	N	12	0	D
	4/253	1357	MARICA (T)	0.55	N	12	0	D
	4/254	1643	CORAL ACE(R)	0.55	N	10	0	D
	4/255	1809	GULF KNIGHT(T)	0.7	N	10	0	D
24 April	4/256	1931	(C)	0.9	N	12	0	N
	4/257*	2219	DAIEI MARU	1.05	N	10	015/7	N
	4/258	2347		1.0	N	10	015/10	N
	4/259	0325		1.0	N	8	050/10	N
	4/260	0431		1.9	N	8	060/11	N



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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Nigh
24 April	4/261	0749	(G)	0.6	N	9	050/7	D
	4/262	0752	LION OF CALIFORNIA (T)	0.5	Y	9	050/7	D
	4/263	0805	JUNO (B)	0.5	N	9	050/7	D
	4/264	1008	ALZAHRA (G)	0.7	N	10	250/7	D
	4/265	1528	MISSION SANTA CLARA (T)	0.6	Y	12	250/26	D
	4/266	1650	TRAVIATA (R)	0.8	N	14	240/26	D
	4/267	1822	STUYVESANT (T)	0.5	N	15	240/26	D
	4/268	2333		2.0	N	12	270/28	N
25 April	4/269	0210		1.9	N	10	260/30	N
	4/270	1548	(T)	0.7	N	12	260/28	D
	4/271*	1747	GOLDEN GATE BRIDGE (C)	1.0	N	10	240/30	D
	4/272	2052		1.1	N	10	240/26	N
	4/273	2122		0.9	N	10	240/26	N
	4/274	2347		1.0	N	10	250/20	N
26 April	4/275	0108	USCGC POLAR STAR	0.8	Y	10	250/18	N
	4/276	0138	EXXON GALVESTON (T)	0.8	N	10	250/17	N
	4/277	0309		0.9	N	10	240/15	N
	4/278	0325	ARCO ALASKA (T)	0.8	Y	10	240/15	N
	4/279	0548	(TT)	1.6	N	10	0	D

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
26 April	4/280	0616	PRESIDENT PIERCE(C)	0.8	N	10	0	D
	4/281	0807	(T)	1.3	N	10	070/5	D
	4/282*	1412	SHIN-KASHU MARU(C)	0.8	N	10	0	D
	4/283	1817	ORIENTAL GOVERNOR(C)	0.4	N	10	280/12	D
	4/284	1838	OGDEN AMAZON(B)	0.8	N	10	280/12	D
	4/285	1952	(G)	1.0	N	11	280/13	D
	4/286	2130	(TT)	1.6	N	12	280/13	N
	4/287	2339	(T)	0.5	N	10	260/6	N
	4/288	0041(?)	PHILADELPHIA SUN(T)	0.8(?)	N	10	260/6	N
27 April	4/289	0045		0.7	N	10	260/6	N
	4/290	0356		1.0	N	10	300/6	N
	4/291	0437(?)	MV RANGE Towing Drill Platform; passed to North	1.0	Y	10	300/4	N
	4/292	0854	MARIA(C)	0.5	N	12	0	D
	4/293	0958	LACONDESA(G)	0.1	N	12	0	D
	4/294	1011	WORLD WING(C)	0.7	N	12	0	D
	4/295	1047	SANKO MARU(T)	1.3	N	12	160/4	D
	4/296	2107		0.8	N	15	0	N
	4/297	2139		0.7	N	15	0	N
	4/298	2212		0.6	N	15	0	N

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
27 April	4/299*	2318	B.T. SAN DIEGO (T)	0.9	Y	15	0	N
28 April	4/300	0013	(R)	0.8	N	15	0	N
	4/301	0027		0.6	N	15	0	N
	4/302	0027		1.0	N	15	0	N
	4/303	0142		0.6	N	13	060/7	N
	4/304	0410		1.0	N	10	060/13	N
	4/305	0729	(T)	1.6	N	4	070/18	D
	4/306	0825	EXXON GALVESTON (T)	0.5	Y	4	075/16	D
	4/307	0926	AMERICAN CONTAINER (C)	0.8	N	2	080/14	D
	4/308	1019	CHEVRON COLORADO (T)	0.9	Y	1.5	090/14	D
	4/309	1030		1.2	N	1.5	090/14	D
	4/310	1047	MAYA PIONEER (Passed to North)	0.5	N	0.7	090/14	D
	4/311*	1137	TANKER (T)	1.0	N	2	090/12	
	4/312	1658	KEN SUCCESS (T)	0.65	N	5	090/13	D
	4/313	1756	ANGELK PROTECTION	0.7	N	5	085/12	D
	4/314	1849	DRAGON MAERSK (C)	0.4	N	5	085/12	D
	4/315	1901	SEA EXPLORER (C)	0.7	N	5	035/12	D
	4/316*	1929	VIOLET (R)	1.0	N	7	030/12	D

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
28 April	4/317	2052		0.75	N	8	110/6	N
	4/318	2341	PORT QUEBEC	0.6	N	10	230/4	N
	4/319	2340	GULF KNIGHT (T)	1.2	N	10	230/4	N
29 April	4/320	0519	EXXON BALTIMORE (T)	0.9	Y	9	0	N
	4/321	0655	ASIA SUN (B)	0.6	N	8	0	D
	4/322	1003	GUARDIAN (B)	0.7	N	9	0	D
	4/323	1103	(C)	1.3	N	10	0	D
	4/324	1127		1.2	N	10	0	D
	4/325	1243	VISHVA (G)	0.8	N	10	0	D
	4/326*	1345	KEYSTONE CANYON (T)	0.6	N	11	170/8	D
	4/327	1707	(T) (Arco)	0.6	N	8	170/11	D
	4/328	2139		1.5	N	8	150/14	N
	4/329*	2205	HIRA MARU	1.5	N	9	150/10	N
	4/330	2243		0.9	N	9	150/10	N
	4/331	2245		1.55	N	9	150/10	N
30 April	4/332	0131		0.25	N	10	260/10	N
	4/333	0211		0.7	N	10	270/10	N
	4/334	0503	(TT)	1.4	N	10	260/10	N

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
30 April	4/335	0654	SOHIO RESOLUTE (T)	1.2	N	10	260/8	D
	4/336	0735	SANTA ESPERANZA (G)	0.5	N	10	260/6	D
	4/337	0820	PRESIDENT JEFFERSON (C)	0.5	N	10	260/5	D
	4/338	1047	(G)	1.2	N	10	260/3	D
	4/339	1055		1.0	N	10	260/3	D
	4/340	1337	SEALAND MARINER (C)	0.3	N	10	0	D
	4/341	1401	PACIFIC SUNSHINE (C)	0.6	N	10	0	D
	4/342	1813	ORIENTAL DIPLOMAT (C)	0.7	N	10	0	D
	4/343	1825	HUTLAND VENTURE (B)	0.8	N	10	0	D
	4/344	1937	(B)	0.5	N	11	0	D
	4/345	1956	(T)	0.3	N	11	0	D
	4/346	2018		0.5	N	12	0	N
1 May	4/347*	2207	EARNEST VENTURE (G)	1.3	N	11	090/3	N
	4/348*	2215	EEKLO (B)	1.0	N	11	090/3	N
	5/1	0216		0.6	N	10	090/6	N
	5/2	0653	NIPPON REEFER (G)	1.2	N	10	0	D
	5/3	(?)	(TT)	(?)	N	10	0	D
	5/4*	1013	NEDLLOYD KINGSTON (G)	2.4	N	10	230/2	D
	5/5	1105	MARIA G.L.	0.6	N	11	230/8	D

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
1 May	5/6	1244	TEXACO GEORGIA (T)	0.5	N	12	230/11	D
	5/7*	1353	PECOS (T)	0.7	Y	12	230/18	D
	5/8	1736	NEPTUNE DIAMOND (R)	0.75	N	12	250/26	D
	5/9	2038		1.2	N	12	245/26	N
2 May	5/10	0010		1.0	N	10	280/18	N
	5/11	0141		1.0	N	10	265/19	N
	5/12	0150		1.2	N	10	265/19	N
	5/13	0412		1.5	N	10	250/10	N
	5/14	0442	EXXON BALTIMORE (T)	1.0	Y	10	250/8	N
	5/15	0650	EASTERN (?)	0.9	N	10	0	D
	5/16	0810	(Tokai Line)	1.0	N	10	0	D
	5/17	0843	POLYNESIA	0.6	N	10	130/4	D
	5/18*	1004	SANTA JUANA (G)	0.9	N	12	240/12	D
	5/19	1651	DON JUAN (R)	0.9	N	12	240/22	D
	5/20	1950	HUMBOLDT REX	0.75	N	11	250/21	D
	5/21	2049		0.7	N	10	250/20	N
	5/22	2153	PRINCE WILLIAM SOUND	0.6	Y	10	250/20	N
	5/23	2222		0.7	N	10	250/17	N

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
3 May	5/24*	0145	ALEMANTIA EXPRESS (C)	0.5	N	10	240/10	N
	5/25	0222		1.5	N	9	245/10	N
	5/26	0331		0.8	N	9	245/10	N
	5/27*	0337	NEPTUNE JADE (C)	0.9	N	9	245/10	N
	5/28	0455		0.75	N	8	260/12	N
	5/29	1229	SANTA MAGDALENA (Com)	0.5	N	8	270/14	D
4 May	5/30	2036		1.0	N	10	250/26	N
	5/31	2220		1.0	N	10	250/27	N
	5/32	0630	ALSTER EXPRESS (C)	0.8	N	10	240/20	D
	5/33	0955	GULF KNIGHT (T)	0.5	N	10	240/10	D
	5/34	1000	ACCESS (C)	1.0	N	10	240/10	D
	5/35	1049		0.9	N	10	240/10	D
	5/36	1347	HILLYER BROWN (T)	1.2	Y	10	240/15	D
	5/37	1447	CHI SONG (B)	1.0	N	10	245/30	D
	5/38	1505	HAWAIIAN SUN (T)	0.8	N	10	245/34	D
	5/39	1833	POTOMAC (T)	0.5	Y	10	250/34	D
	5/40*	2019	OAK PEARL (T)	1.0	N	12	255/30	N
	5/41	2044	(Medium size)	1.3	N	12	260/28	N

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
4 May	5/42	2236	(Large)	0.9	N	12	260/28	N
	5/43	2301	(C) (Large)	0.7	N	12	260/28	N
5 May	5/44	0114		1.8	N	12	260/27	N
	5/45	0439		1.0	N	12	270/24	N
	5/46	0544	(B) (Small)	0.8	N	12	270/24	N
	5/47	1125	TOYOTA NO. 21 (R)	0.4	Y	15	260/22	D
	5/48*	1250	HOEGH MUSKETEER (C)	1.1	N	15	260/22	D
	5/49	1326	PACIFIC ARROW (C)	1.0	N	14	260/25	D
	5/50	1448	MOSA PIJADE (G)	0.7	N	12	260/28	D
	5/51	1455	SABO SEVEN (B)	1.1	N	12	260/28	D
	5/52	1640	TOWER BRIDGE (C)	1.5	N	12	260/28	D
	5/53	1827	HIYUNDA NO. 2 (R)	0.6	N	12	260/28	D
	5/54	2002	LEISE MAERSK (C)	0.8	N	14	260/24	D
	5/55*	2309	HOTAKA MARU (C)	1.1	N	15	260/20	N
	5/56	2344	(Medium-small)	1.0	N	15	260/20	N
	5/57A	2341	(Medium)	1.3	N	15	260/20	N
6 May	5/57B	0048		0.9	N	15	260/20	N
	5/58	0046		0.9	N	15	260/20	N



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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
6 May	5/59	0524	(C)	0.9	N	12	340/14	N
	5/60*	1040	APLI CHAU (G/C)	1.2	N	10	250/10	D
	5/61	1240	CAPTAIN DIAMANTIS (T)	0.6	N	10	250/10	D
	5/62	1931	SIRIUS (C)	1.1	N	12	270/18	D
	5/63	1946	MING UNIVERSE (C)	1.0	N	12	270/18	D
7 May	5/64	2048	(Medium-large)	1.1	N	12	270/16	N
	5/65A	2246	(Large)	0.8	N	12	265/15	N
	5/65B	0038	(Small)	0.4	Y	12	260/14	N
	5/66	0153	(T)	0.7	N	11	060/4	N
	5/67	0447	SEAPAN MONARCH (TT)	1.9	Y	10	260/4	N
	5/68*	1134	ATIGUN PASS (T)	1.5	N	8	280/12	D
	5/69	1325	SEALAND PATRIOT (C)	1.0	N	9	275/14	D
	5/70	1354	EXXON BOSTON (T)	0.9	N	9	275/14	D
	5/71	2049	(T) (Large)	1.0	N	10	270/18	N
	5/72	2101	(Medium-small)	1.5	N	10	270/18	N
5/73	2147		0.7	N	10	270/18	N	
5/74	2233	(G) (Small)	0.7	N	10	270/18	N	
5/75	2306	(Medium)	0.9	N	10	270/18	N	

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
8 May	5/76	0052		0.7	N	10	270/18	N
	5/77	0336	LION OF CALIFORNIA (T)	1.3	Y	10	240/18	N
	5/78	0735	SUN PACIFIC (G)	1.2	N	8	240/16	D
	5/79	1048	AMERICA MARU	0.8	N	8	240/16	D
	5/80	1217	CIELO DI GENOVA (G)	0.6	N	8	240/16	D
	5/81	1524	OCEAN ACE (G)	1.1	N	8	260/18	D
	5/82	1631	OVERSEAS BOSTON (T)	0.9	N	8	265/19	D
	5/83	(Combined with 5/84)						
	5/84	2039	(Medium)	0.4	N	8	270/22	N
	5/85	2256	(Medium)	0.8	N	10	265/21	N
	5/86*	2326	ANTONIA JOHNSON (C)	0.9	Y	12	260/20	N
9 May	5/87	0325	CHEVRON WASHINGTON (T)	1.5	Y	12	260/24	N
	5/88	0348	GULF KNIGHT (T)	0.5	Y	12	260/24	N
	5/89*	0711	MOBIL ARCTIC (T)	0.6	N	12	250/18	D
	5/90	1314	SEA WOLF (TT)	0.7	N	12	250/16	D
	5/91	1443	NANSIO MARU (B)	1.0	N	12	260/16	D
	5/92	1647	TEXACO MINNESOTA (T)	1.2	N	10	260/18	D
	5/93	2047	CHEVRON OREGON (T)	0.7	N	12	0	N

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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
9 May	5/94	2054	(TT)	1.0	N	12	0	N
	5/95	2214	(Medium-large) (Foreign)	1.0	Y	12	0	N
	5/96	2317		1.1	N	12	0	N
	5/97	2322		0.7	N	12	0	N
10 May	5/98*	0055	TAKARA (R)	0.6	Y	12	260/5	N
	5/99	0435	MARINE EXPLORER (TT)	0.7	Y	12	260/21	N
	5/100	0540	(TT)	0.9	N	12	260/24	D
	5/101*	1046	BUNGA MELOR (G)	1.0	N	13	275/27	D
	5/102	2240	EXXON BENICIA (T)	0.9	N	11	285/27	N
	5/103	2246	CIVILIAN HIGHWAY	0.8	N	11	285/27	N
11 May	5/104	2257	(C) (Medium-large)	0.8	N	11	285/27	N
	5/105	2351	(Medium)	1.2	N	12	290/26	N
	5/106	0042		1.0	N	12	280/25	N
	5/107	0418		0.8	N	12	260/21	N
	5/108	0734	(T) (Small)	0.5	N	12	250/20	D
	5/109	0818	(T)	0.3	N	12	245/19	D
	5/110	0848	KOREAN AMEINYST (G)	0.6	N	12	240/18	D
	5/111	0851	CROWN CHERRY (G)	0.4	N	12	240/18	D

APPENDIX A (Cont.)  
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Date	Target No.	Time Abeam	Vessel's Name and/or Type	CPA (n. mi.)	Comm. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/Night
11 May	5/112	1008	ARCO ALASKA (T)	0.5	N	12	235/16	D
	5/113	1113	(C)	0.5	N	12	225/14	D
	5/114	1750	RUHR EXPRESS (C)	0.8	N	8	260/26	D
	5/115	1951	SEAPAC LEXINGTON (C)	1.0	N	11	260/25	D
	5/116	2348	VEIA (B) (Large)	0.2	N	12	260/20	N
	5/117	2400	(Small ship)	0.6	N	12	260/20	N
	5/118	0440		0.5	N	12	270/15	N
12 May	5/119	0512	GALEON (?) (Japanese)	1.0	N	11	270/15	N
	5/120	0540	AEGEAN SUN (T)	1.0	N	10	270/16	D
	5/121	0702	GOLDFORDS TRAILBLAZER (T)	0.6	N	9	270/17	D
	5/122	0713	PEPE LE MOKO (G)	0.7	N	9	270/17	D
	5/123	0718	EXXON JAMESTOWN (T)	0.5	Y	9	270/17	D
	5/124	0814	OCEAN RAINBOW (T)	1.0	N	7	270/17	D
	5/125*	0946	EVER SUPERB (C)	0.5	N	6	270/18	D
	5/126	1408	US NAVY ATF 113 (Tug)	0.3	N	7	270/22	D
	5/127	1417	RICHMOND BRIDGE (C)	0.5	N	7	270/22	D
	5/128	1935	LEDA MAERSK (C)	1.1	N	9	260/29	D
	5/129	1955	AMERICAN LEGION (C)	1.0	N	9	260/29	D

APPENDIX A (Cont.)  
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Date	Target No.	Time Nbeam	Vessel's Name and/or Type	CPA (n. mi.)	Conn. (Yes or No)	Vis. (n. mi.)	Wind (Dir. Vel.)	Day/ Night
12 May	5/130	2103	(T) (Large)	0.6	N	10	260/30	N
	5/131	2230	METEOR(G)	0.5	Y	11	265/30	N
	5/132	2302	COLORADO(T)	0.8	N	11	265/30	N
	5/133	2317	(Medium size)	0.7	N	12	270/30	N
13 May	5/134	0048	NEPTUNE DIAMOND	1.0	Y	12	265/28	N
	5/135	0108	(Large)	1.0	N	12	260/27	N
	5/136	0308	(Medium)	0.7	N	12	240/20	N
	5/137	1002	PHILADELPHIA SUN(T)	0.6	N	7	250/4	D
	5/138	2158	(Unidentified-passed to North)	0.9	N	12	260/20	N
	5/139	2204	(Medium)	0.7	N	12	260/20	N
	5/140	2240	(Medium)	0.9	N	12	265/20	N
	5/141	2232	(Medium)	1.0	N	12	265/20	N
	5/142	2359	(T) (Large)	0.6	N	12	270/20	N
14 May	5/143A	2340		1.4	Y	12	270/20	N
	5/143B	0104		0.8	N	12	270/20	N
	5/144	0145	USCGC CITRUS	0.9	Y	12	270/20	N
	5/145	0505		1.6	N	12	270/20	N

28 March 1920 ARABELLA - can't identify from TDR's--no contacts at this time--range excessive (6 mi.)  
(Note: check original - copy hard to read.)

